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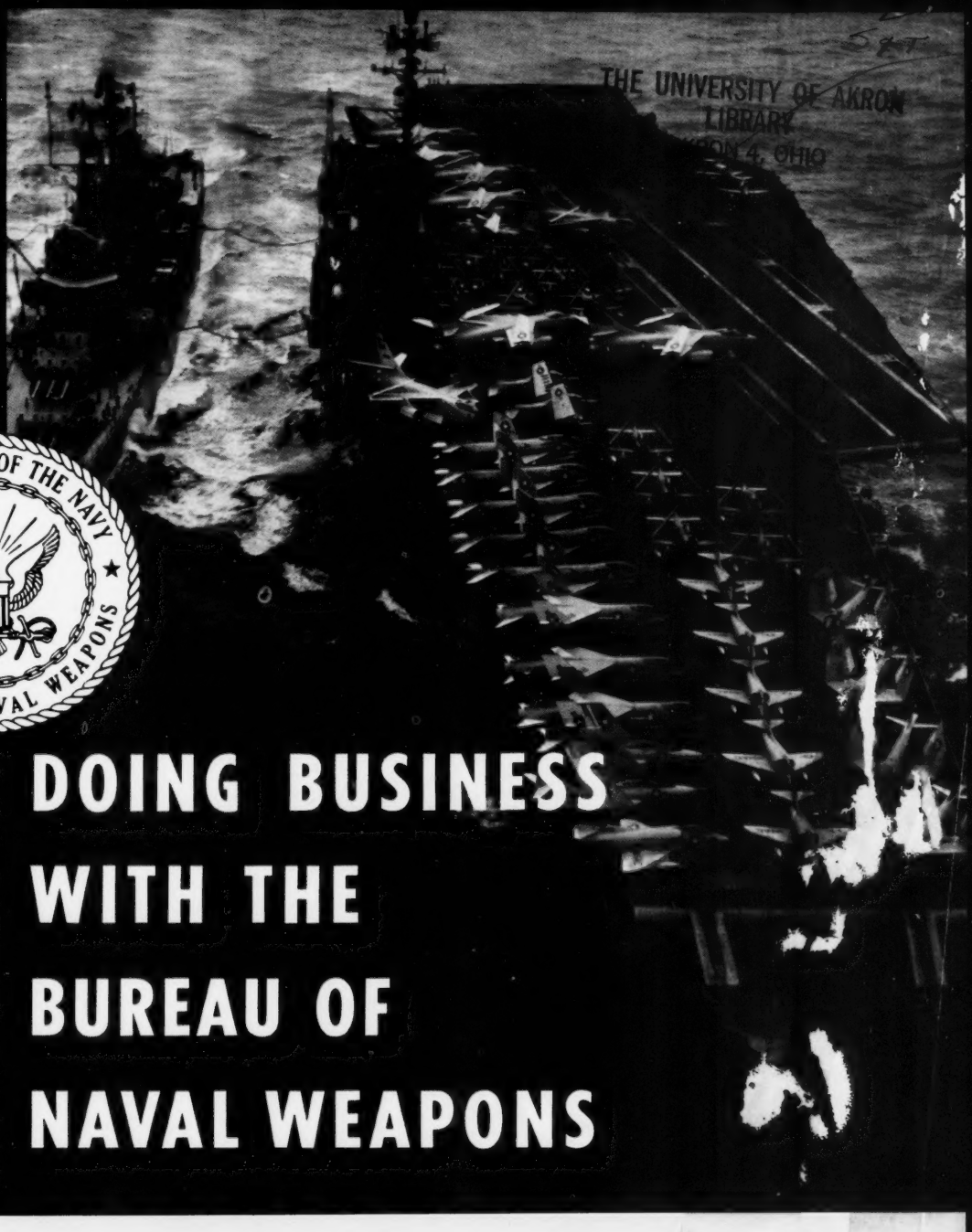

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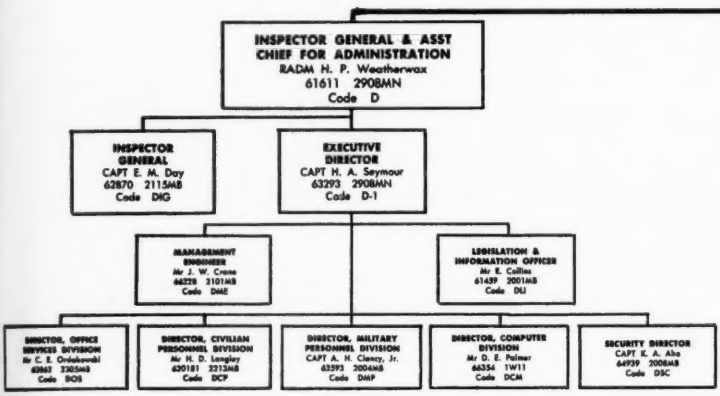

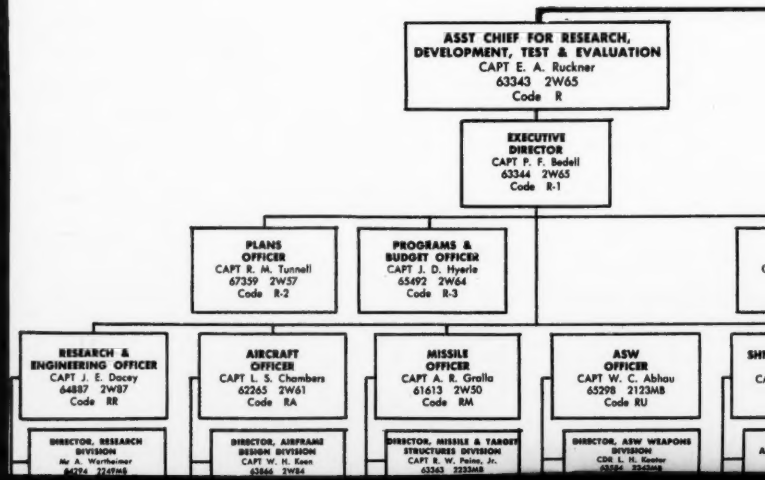

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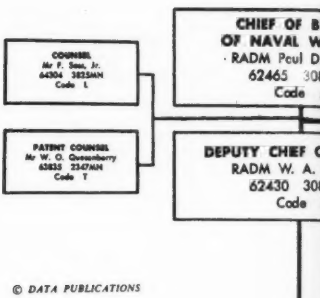

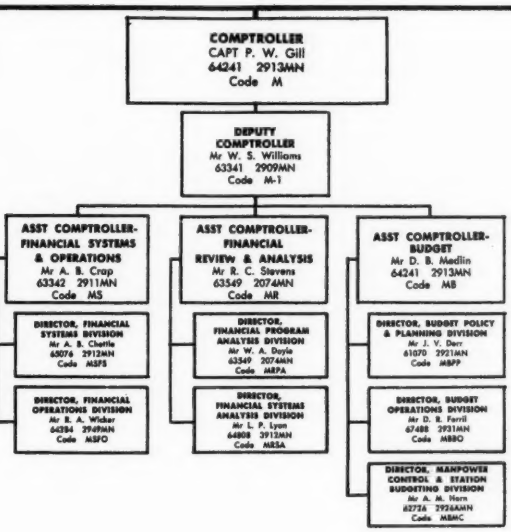

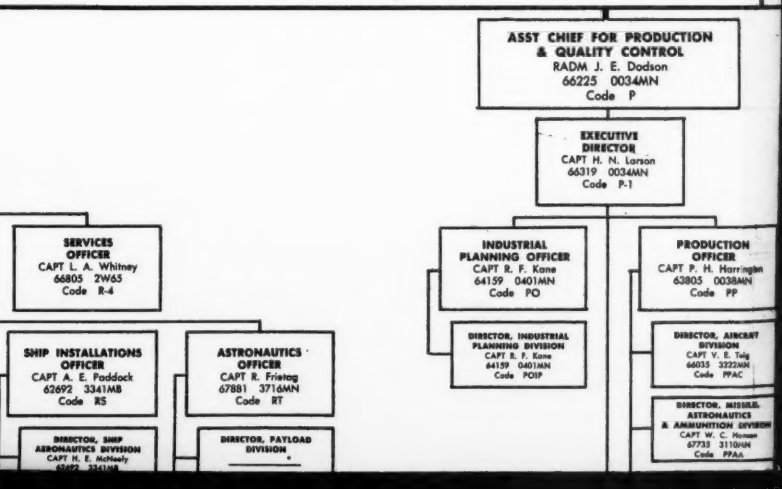

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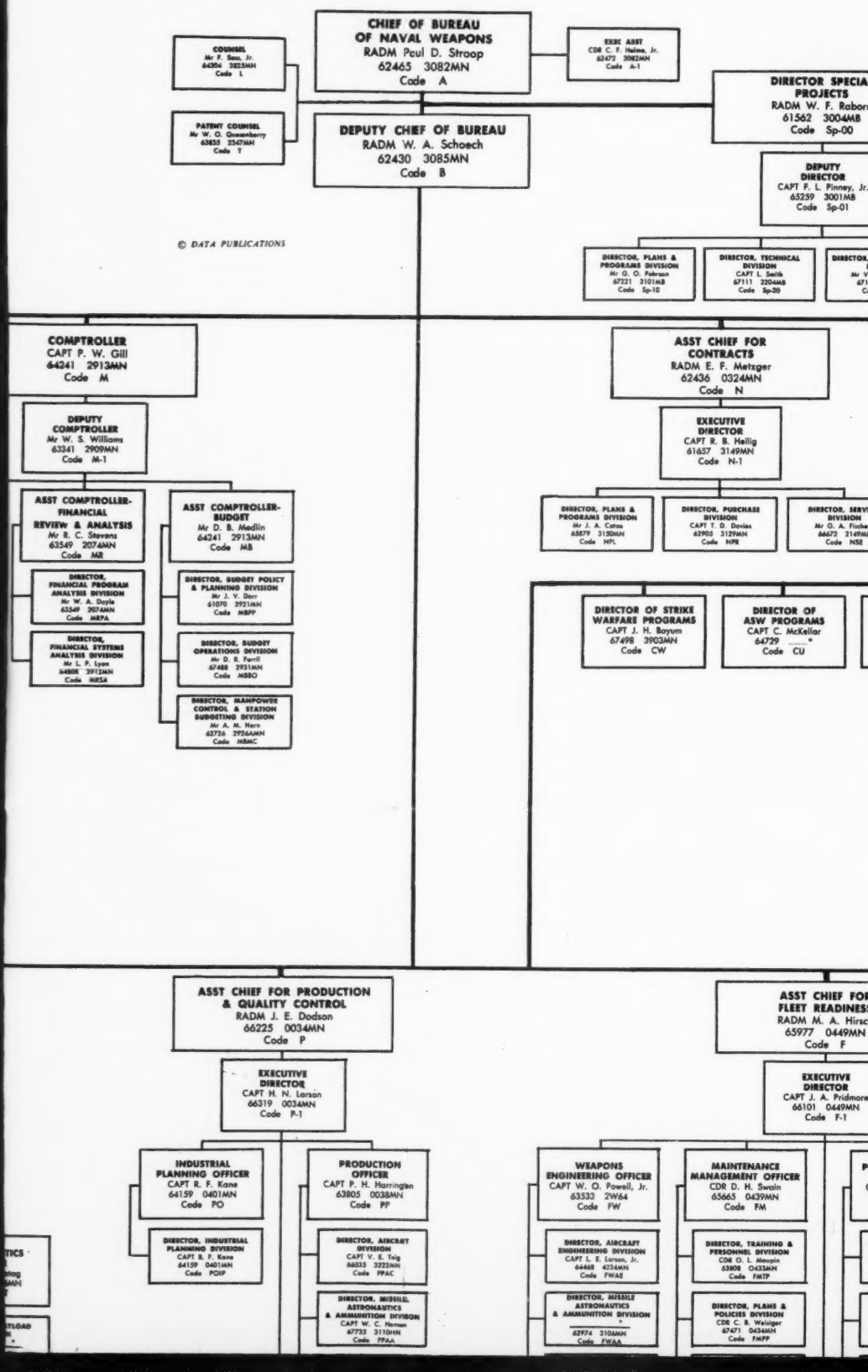

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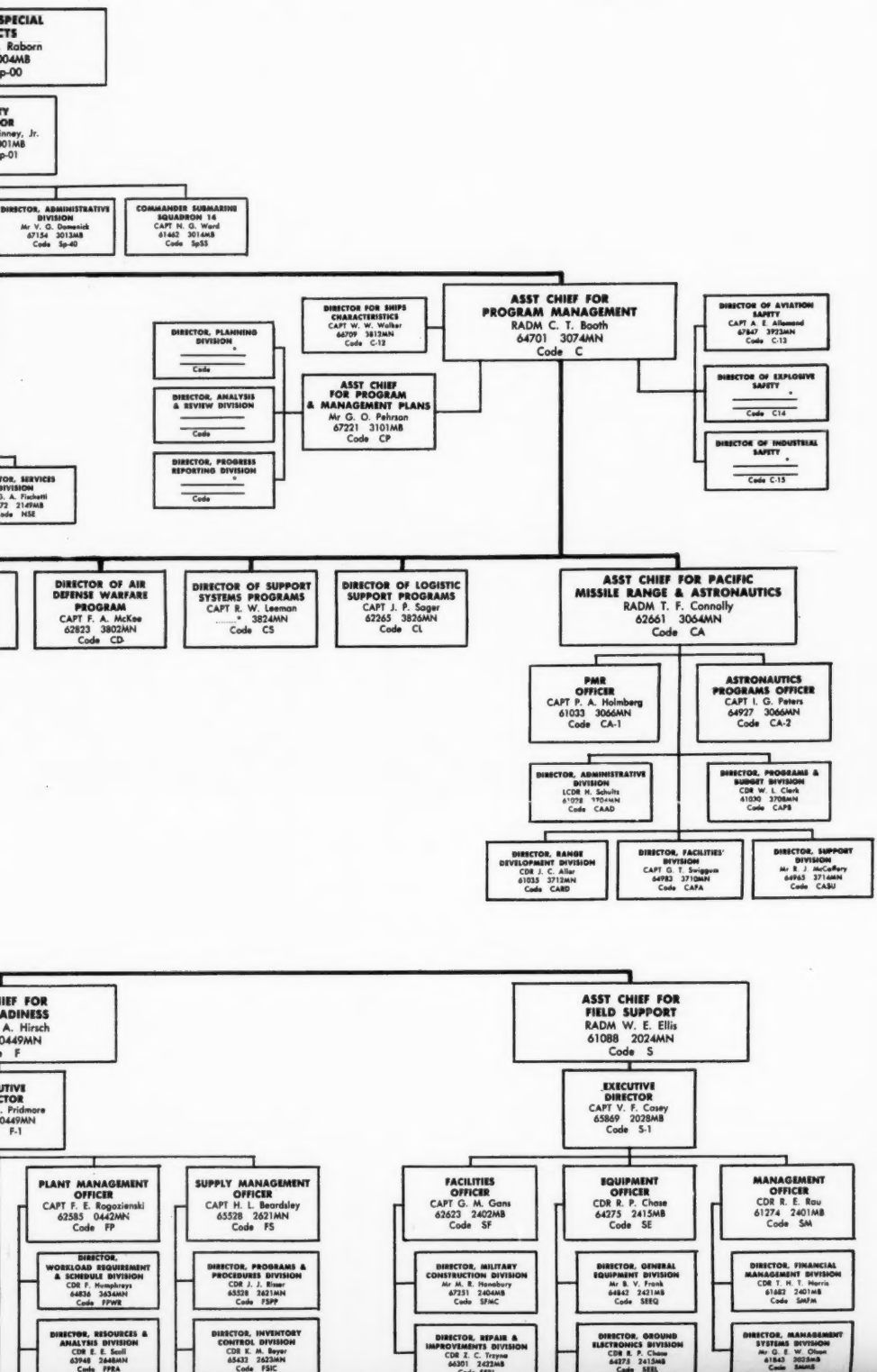

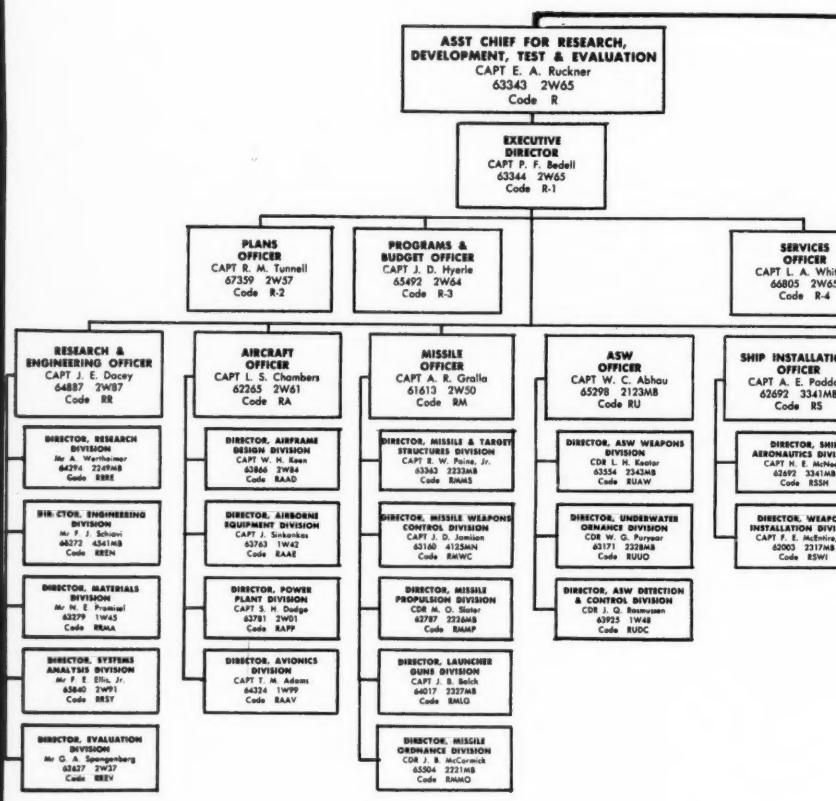
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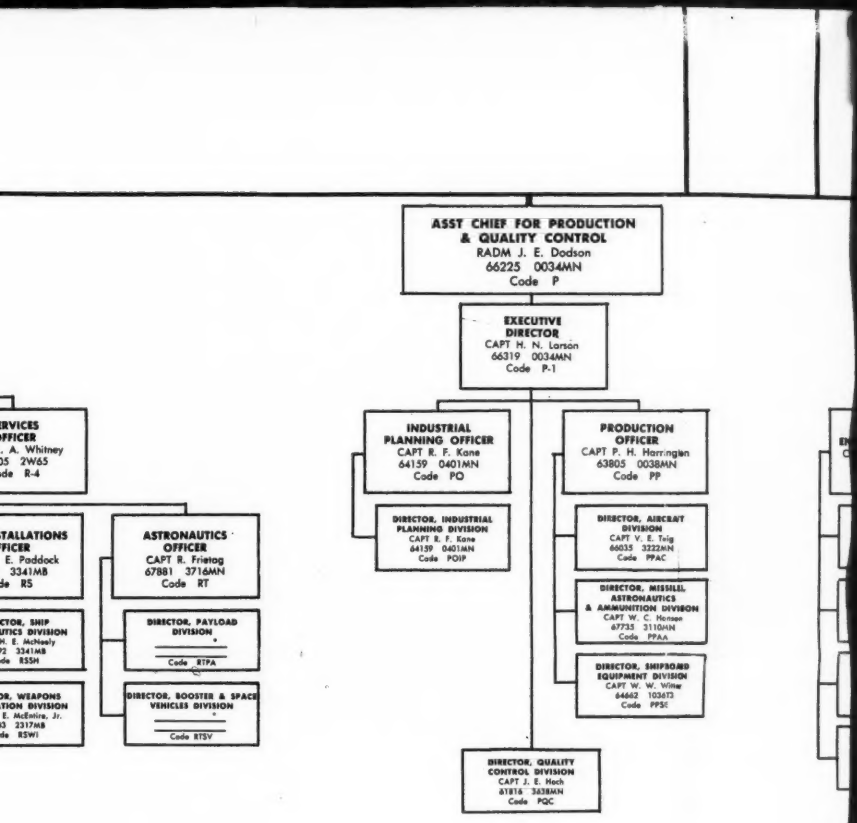

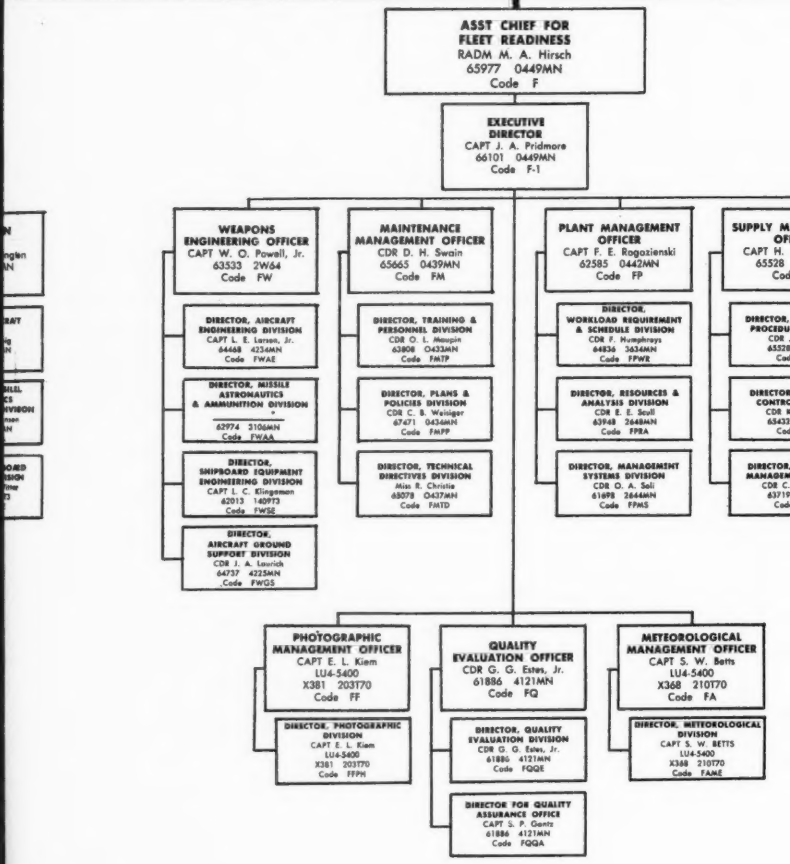

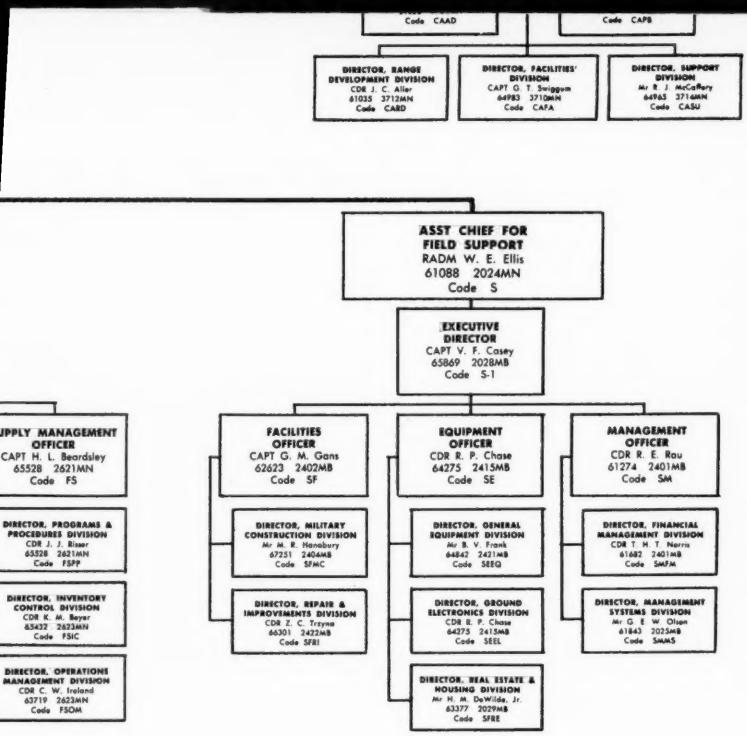

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Refueling in the Mediterranean Sea. USS BOSTON (CAG-1) is on the left and USS SARATOGA (CVA-60) is the carrier at right. U.S. Navy Photo.

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NEXT MONTH IN DATA

The March 1960 issue of DATA will feature NASA. See page 10 for details.

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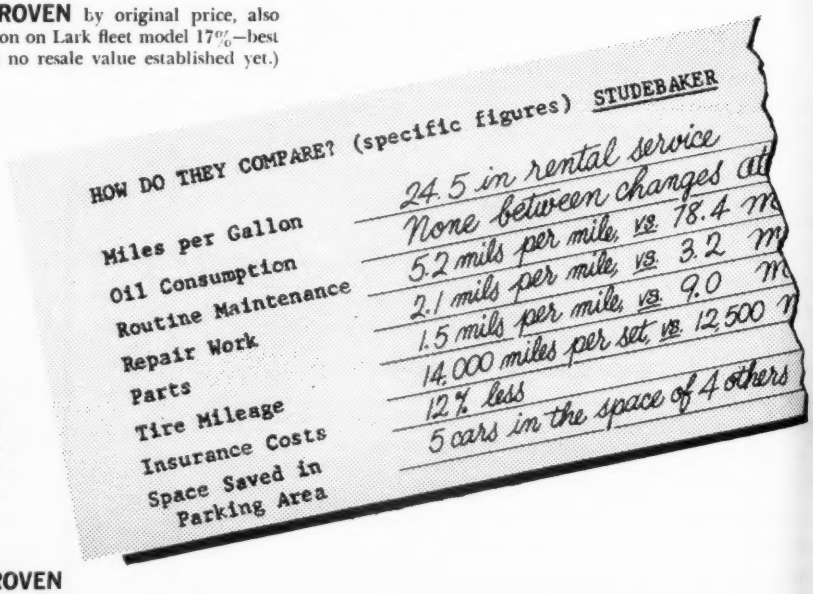

4. LOWEST REPAIR COST PROVEN by fleet records "2.1 mils per mile, against 3.2 mils per mile" (car rental, Colorado)—"No repairs, no new parts, after 10,000 miles on each Lark" (telephone company in Oregon).

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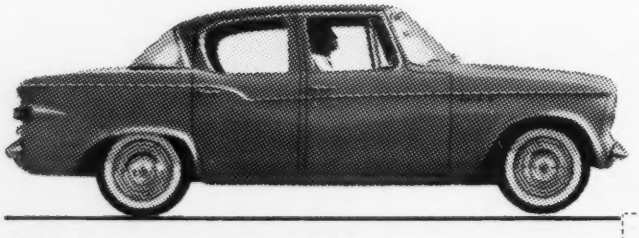

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WASHINGTON REP REPORTS

THE NAVY ANSWERS SOME DATA QUESTIONS

Q. Do you think the POLARIS range will eventually increase, or is its present range satisfactory?

A. Current POLARIS missiles with ranges up to 1500 miles are in the final testing stage. When the program began we had 1500 mile range as a requirement and a target date of 1963. We later accepted a degradation in range to 1200 miles in order to have the system operational by 1960. The 1500-mile missile is still an objective we expect to achieve by 1961. Actually, we are considering the development of a second generation POLARIS with a range up to 3000 miles.

* * *

Q. Are the manned planes on the way out?

A. No. Manned aircraft will always be required in modern warfare as long as the ability to perform certain tasks with precision is required. Precise pinpointing of targets can be accomplished only with manned aircraft. Reconnaissance missions also require manned planes. Where there's a danger of hitting our friends . . . such as in the Lebanon crisis . . . manned planes must always be used. Missiles cannot make decisions.

* * *

Q. Some experts believe that Western Europe would be lost in event of a major war—what is the Navy's view?

A. The Navy doesn't believe this. In the first place, with the advent of the ballistic missile, combined with nuclear weapons, the probability of general war is becoming more and more remote. But of course we always have to be prepared for it.

* * *

Q. If the Russian submarines ever showed up in force, would the U. S. Navy be able to counter them?

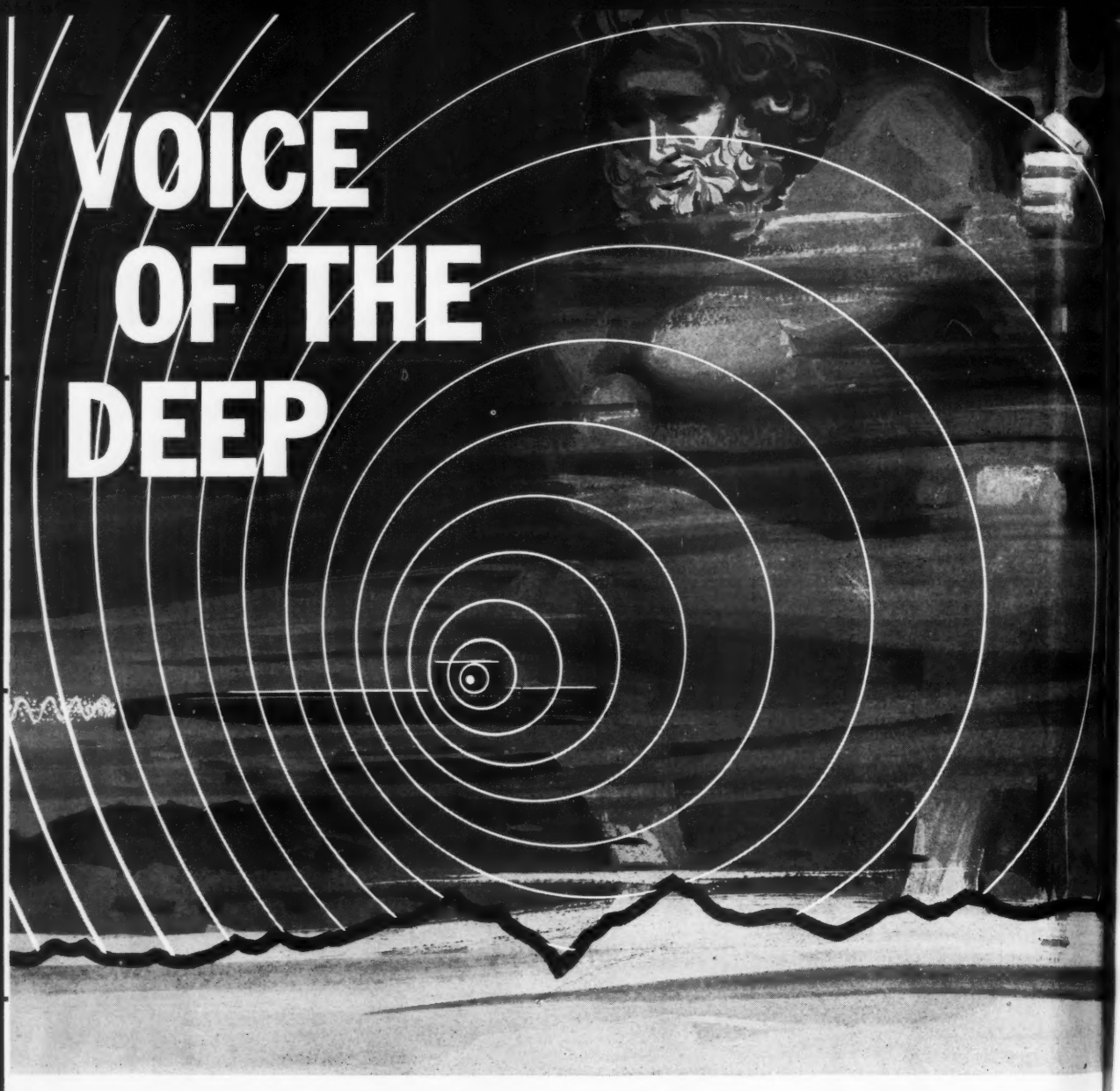
A. No, not all. You can never have an absolute defense for anything.

* * *

Q. How is the Navy's Anti-Submarine Warfare program coming along?

A. The Navy has made some remarkable progress in a good many areas—but not enough. We would like to detect at much greater ranges. If we were sure that we could pick up all subs and identify them at 20 miles or 30 miles, we would be happy.

NAVY GUNNER DRAWS A BEAD in gunner's cockpit of this sturdy N-9 aircraft. This photo, taken 13 Aug. 1918 gives indication of the progress made in naval weapons since that date. USN photo.



Neptune, the mythological ruler of the deep, had all the waters of the earth as his domain. Triton, his son, was assigned the vital task of communicating his father's commands to subordinates in all parts of the ocean.

The U. S. Navy has need of a counterpart for Triton. RCA is now assisting in this role through development of a communication link to our new nuclear powered Polaris-carrying submarines, anywhere on the seven seas.

RCA, in addition to its Polaris developments, is also working on many new Undersea Warfare systems such as detection, classification and destruction of enemy submarines as well as coordination of our friendly air, surface, and subsurface effort.

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Feature Editorial

DATA/Bureau of Weapons Issue

THE NEW FRONTIER: HYDROSPACE

by Martin Caidin/DATA

There's an old saying to the effect that men sometimes cannot see the forest because of all the trees before their eyes. In modern parlance, this might be translated into reading that we can't see the riches beneath us because we're reading and writing too many glittering words about the newly-discovered radiation environment far over our heads. *Space* is a big topic nowadays, but too few people realize that there are different kinds of space—beyond the atmosphere; too little space for an expanding population of the world; and, among others, *hydrospace*. The new frontier is equally as fascinating as poking our heads into the vacuum above the earth; and there are some people who believe quite strongly that we'll have a far greater reward out of increasing our versatility of movement and control in the depths of our oceans than away from this planet.

This issue of DATA is devoted to weapons, but in my editorial I'd like to digress from that. As an observer to the fantastic scientific and engineering accomplishments of the United States Navy, I've accumulated information that truly is astonishing. *USN has been a world-beater in scientific research, pure and applied, and the nation has benefited enormously from this work.* For some strange reason—at least from where I sit—USN has received virtually no public attention for this effort or its rewards. It seems that if we discover a new layer of electrical particles dancing around at 200 miles altitude the result is a headline; but that Navy's steady, solid scientific laboratory and field program that has been under way for years, rarely rates more than a blurb in the back page of a newspaper.

Now take this business of hydrospace. Right now its a matter of weaponry, of building rapidly a fleet of nuclear-driven, IRBM-carrying submarines. It involves the entire critical spectrum of ASW, and any next war is going to see just about as much action beneath the sea—in terms different from World War II —as it will above the surface.

But after this military need is met; what does all this mean? Without searching around for hidden meanings, its obvious that our country is about to gain in very solid, practical, economic, strategic, and military fashion. Those new submarine hulls and power systems mean hydrospace exploration that will truly open up the ocean depths. It means vital personnel and materiel delivery when and where needed. It means future submersible ocean liners, trains of fuel tankers, cargo vessels of all sorts, and at much higher speeds and with greater efficiency than can now be achieved.

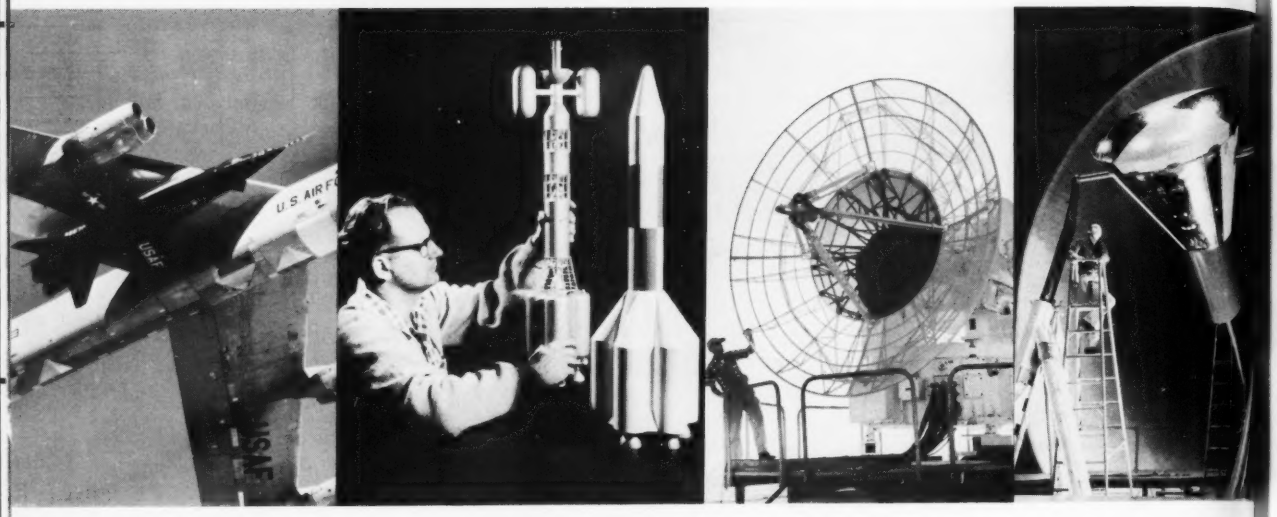
The amazing part of all this is that its only the beginning. *What's been done in hydrodynamics is nothing as compared to the doors that are just being opened.* Speed *is* important, and the safety and unique features of a submerged passenger run one day won't be a novelty, but rather stiff competition for surface and air transportation. A ship like the *Queen Mary* expends much of its power in producing bow waves, and will never be much faster. Sure, an ocean cruise is a delightful thing, but not in the winter in the North Atlantic! There are many adjectives to dig up on submersible commercial transportation, but I'll leave that to Madison Avenue.

These are random thoughts on un-military work, coming out of the fantastic developments now under way by Navy in general, by BuWeps in particular. But like so many other "specific and military" projects, the military need was met, and then a new branch of prosperity "befell the nation."

Well, these things don't happen by accident. From this corner, kudos for USN in its pioneering and brilliant work in this new region to explore and develop, and all the better for the United States, not just today, but for many tomorrows.

—MARTIN CAIDIN

NASA



MARCH 1960 ISSUE OF DATA

NASA! Spending over $500 million in fiscal 1960, the National Aeronautics and Space Administration has become the Giant among giant Government agencies vying for space exploration laurels. Since its inception on 1 October 1958, NASA has racked up an impressive record of accomplishments and has become a storehouse of fabulous potential space power.

Bearing little resemblance to the former National Advisory Committee for Aeronautics from which it was created, in the short 15 months it has been in existence NASA has left the Advanced Research Projects Agency hanging on the ropes in a pulverized mass after the brief ARPA vs. NASA competition last year, has taken the entire SATURN Project along with Der Herr Doktor Von Braun and his staff away from the "Rape"-shouting Army missilemen, and now finds itself in charge of all the LARGE BOOSTER projects of the United States.

NASA! The inventory of space hardware controlled by this new Government Giant is staggering. MERCURY! SATURN! JUNO II! NOVA! SCOUT! — Oh yes! and a main stockholder in the X-15 project.

Because NASA will unquestionably be the greatest sinew of strength in our national space arm for the decades to come, DATA is preparing a special reference book on this activity for the use of our regular Defense and Industry subscribers, key Government executives and Military Commanders. Paul Haney of NASA is the activity project officer, Harold Helfer of DATA will be the liaison and main copywriter and Martin Caidin of DATA will present the feature editorial. That's NASA in the March 1960 issue of DATA . . . Don't miss it.

INTERPRETIVE DATA

By Harold Helfer/DATA

DRAG REDUCTION

A dramatic breakthrough in sea and air transportation may be in the making.

It has been found that a coating can be applied to an object and reduce the turbulence normally created as the object moves through the water. There is no reason to believe that the same thing won't apply to missiles, rockets and planes in flight.

Efforts are underway now to develop these coatings and there is high hope that something will come of this, but the significant thing is the discovery that there is a new dimension to movement.

It always has been assumed that there were two principle factors which determined the progress of a craft through water or air. One was its shape, the other the degree of smoothness. But now there is a third concept too . . . the "skin" of the object.

To better understand what is involved, perhaps it would do well to tell the story of how this new thought arrived. Like so many other insights of man, this came out of a clear blue sky . . . or, clear blue water, if you wanted to be more exact about it.

A scientist, Dr. Max O. Kramer, originally from Germany but who now makes his home in Los Angeles, was on a ship crossing the sea and he found himself fascinated by the playful porpoises. He was intrigued by how they swam so swiftly and with so little apparent effort.

Always interested in movement and transportation . . . he had been head of the Aerodynamic Institute of the German Research Center for Aeronautics . . . he found himself wondering why did these porpoises swim so well and why were they such smoothies in the water. Based on his previous research in the field of motion, he couldn't help but feel that the sea creatures should be encountering *drag* that would slow them down considerably. In fact, Dr. Kramer was convinced that the porpoises were avoiding nine tenths of the drag that should be expected from objects of their contours. The question was *why?*

Dr. Kramer found himself so absorbed by this that he began studying porpoises on dry land too . . . in his Los Angeles laboratory. His conclusion was that the "secret charm" of the porpoise which enabled it to defy the normal drag of the elements and prevailing law of physics was its skin. *The animal was covered with a 1/16th-inch "hydraulic" affair that was both elastic and ducted.*

And so Dr. Kramer conceived of his theory of "anti-turbulence" or "boundary layer stabilization." In other words, if the porpoise had a built-in factor which countered the turbulence of a body in movement, why not apply this to man-made craft?

Of course, you couldn't very well wrap a ship or a plane in porpoise skin. But Dr. Kramer did go to work and try to develop a coating that would have the same effect as porpoise skin to the porpoise.

Many compounds and designs have been tried. The most practical thus far appears to be a thin layer of rubber supported by a multitude of tiny rubber pillars. Inter-connecting channels between the pillars contain a freely flowing viscous liquid. The channels face the surface of the object. The outside, or water side, of the coating is smooth. The channels give the coating flexibility, and the liquid provides the necessary damping to suppress potential turbulence.

Anyway, it looks as if something really big in water transportation development, and perhaps air transportation too, may be around the corner. To date, there seems to be particular promise for submarine-type craft in the application of this "new dimension" factor. *DATA can report that a 50% reduction in drag already has been achieved in underwater experiments.*

Vice Admiral Charles B. Momsen (Ret.), who is the developer of the sub lung escape apparatus that bears his name and is regarded as one of top sub experts of the nation, believes that submarine speeds of 60 knots (about 70 miles an hour) . . . almost twice as fast as even the fastest sub speeds today . . . would be possible with the development of a "submarine skin." With further improvement in power plants, V/Adm. Momsen predicts *the time will come when underwater craft will be making about 180 knots, or 207 miles per hour!*

*As a matter of fact, Admiral Momsen is convinced the day is coming when there'll be fast moving cargo subs towing chains of rubber containers filled with oil, chemicals or bulk commodities. And he thinks this will inevitably lead to scheduled passenger undersea travel too.**

**Ed. Note: Marty, you and Admiral Momsen should get together. Readers, please note feature editorial by Martin Caidin this issue.*

It is estimated now that objects in motion sometimes use as much as 90% of their propulsive energy to overcome the drag due to the turbulence they create. If this drag can be cut down, it means much progress in getting somewhere faster without increased power or travelling at the same speed with less power required.

There seems to be no question but that a coating can be and will be provided that will lead to some advances in speed and utilization of existing power for many craft, and, it is also plain, there is involved in this the possibility of progress of a major and fundamental sort. Some scientists are already convinced that this new concept in travel will become as important to water transportation as the pneumatic tire now is to land transportation. It looks like this idea of a "skin" for vehicles is something much more than something skin deep.*

**Ed. Note: Readers may be interested to know that the S. C. Johnson Company of Racine, Wisconsin is working on drag-reduction finishes for Government uses and has been actively engaged in their development over the past two years.*

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MISSION of the Bureau of Naval Weapons

The Bureau of Naval Weapons is responsible for the research, development, design, test, operating standards, manufacture, alteration, repair, overhaul, material effectiveness, disposition and salvage of all Naval weapons, Navy and Marine Corps aircraft, airborne target drones, photographic and meteorological equipment, astronautic vehicles and supporting equipment; and all pertinent functions relating thereto.

BUDGET of the Bureau of Naval Weapons

When the Bureau of Naval Weapons was being organized, it was estimated that it would be operating on a fund of around 4½ billion dollars a year.

The Field Support Division, with its air stations, training centers, base commands, intelligence centers, etc., was slated to get most of this money, around $2,900,000,000.

Research, Development, Test and Evaluation was slated to get around $700,000,000, about 70% of the Navy's total R&D funds.

The Fleet Readiness Division was due to receive about one billion dollars.

But BuWeps will not get quite all this money in actual fact. Just how far off the planned and hoped-for mark this is, isn't quite certain at the moment but it's probably about one-fourth off.

NAVY SUPPLY

APRIL 1960 ISSUE OF DATA

THE CYCLE of supply in this man's Navy is a big story. Every hour of every day the NAVY SUPPLY SYSTEM delivers highly mobile logistic support to satisfy the needs of our new nuclear Navy all over the world.

Global seapower needs missiles, nuclear weapons, aircraft, electronic gear, support equipment, parts, components, uniforms, food, and fuel to add strength to the most valuable commodity of all—the men who make the muscle of our naval establishment.

What should both contractors and procurement officers know about the big picture of the NAVY SUPPLY SYSTEM? They should be clued-in to the new procedures and techniques being used by USN SC in their SINGLE MANAGER CONCEPT, TECHNICAL FUNCTIONS, SUPPLY FUNCTIONS, the BUSANDA ORGANIZATION, what goes on in the various parts of NAVY SUPPLY—ASO, ESO, etc. What do contractors now in the SYSTEM *think* of it? What would they like to see changed?

In April 1960 DATA tells the NAVY SUPPLY SYSTEM story as it should be told to contractors, military commanders and procurement officers. Whether you're in Navy blue or gray flannel, if you are concerned with naval readiness, global seapower, long-range naval planning, logistical support problems, Navy Buying or Navy Selling, you won't want to miss the April 1960 issue of DATA, the NAVY SUPPLY SYSTEM issue.

Advertising commitment date: 7 March 1960. Deadline for copy and artwork 20 March 1960.

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THE FULL SKINNY* ON BUWEPS

by Harold Helfer/DATA

**(For those DATA readers who are unfamiliar with Navy jargon "skinny" means information—more specifically, background information. For example: If you were to "info CHINFO on the ALNAV from SECNAV" you would be giving the Chief of Navy Information the "Skinny" on the Secretary of the Navy's instruction to all active Naval personnel.* —Ed.)

Before any merger, marital or government, there is a certain amount of bickering and resentment anticipated. Perhaps this arises from the impending submergence of two entities into one union. In any case, the splicing of the Bureau of Ordnance and the Bureau of Aeronautics into the Bureau of Naval Weapons contradicted the normal course of events and was accomplished with little opposition on either side. This unruffled merger, a rare thing in a Government shake-up, was accomplished because of a close similarity and cooperation between the two agencies.

When the Navy established its Bureau of Aeronautics back in 1914, an eventual linkage with BuOrd was already foreshadowed. Early in the development of aircraft, it became apparent that planes were capable of remote control and, if this were so, it would be a natural thing for men to think in terms of guiding combative missiles through the sky while the human operators of these things remained behind in more secure surroundings. As a matter of fact, though it may come as something of a surprise to some, the Navy's first efforts in the guided missile field hark way back to the Spring of 1917.

BUORD VS. BUAER

It was reasonably clear, even then, that there was a conflict of interests between this new upstart, the Bureau of Aeronautics, and the old established Bureau of Ordnance whose principle job for many years had been simply to supply ships with muzzle-loading cannon. And a missile, which of course is an ordnance weapon, is also, in concept, know-how, and skills, in the field of aeronautics.

As work in the missile field continued, particularly with all the acceleration it received after World War II, the dichotomous nature of the situation became increasingly evident. The inter-relationship of fire control and radar of combat aircraft became so closely tied with the aircraft weapons and particularly airborne missiles that the concentration of this effort just naturally seemed to go to BuAer. But it also was becoming clear that it wasn't easy to draw clear-cut demarcation lines between the various areas of jurisdiction. More and more conferences had to be held to decide whether a certain project belonged more correctly in BuOrd or BuAer.

The problems were something like this: missiles designed for air-to-air missions, plainly a BuAer responsibility, nevertheless required components of propulsion warheads, fuses, and other such devices whose production skills, know-how, and capability rested with BuOrd. As a matter of fact, the relationship between the two bureaus was so entwined that BuOrd found itself completely in charge of the air-to-air missile SIDEWINDER.

What happened in most cases was that BuOrd would find itself involved in some phases of a project, BuAer in another. If it didn't always lead to confusion, it resulted in something that was just as unwanted and undesirable in a military establishment: *split responsibility.*

BUWEPS ESTABLISHED

Something had to be done about it and all through the 1950's there were murmurs and mutterings about a BuOrd and BuAer merger but it wasn't until the tail-end of 1959 that BuWeapons was finally established after the study and recommendations of the now Secretary of Navy William Franke and his committee.

Oddly enough, one of the complaints heard about the merger is that it "took place too quickly." The problem here does not concern the philosophy and policy of the new Bureau but its administrative set-up. In taking over the job of implementing the merger, actually setting up the new establishment and giving it its shape and functional apparatus, Vice Admiral Ed Clexton and Rear Admiral Charles Martell had the choice of working things out on a gradual basis, hammering everything out slowly but surely, or accomplishing their task in bold, broad strokes. They choose the latter course.

While the surgery may have been admirably clean-cut, the general opinion seems to be that it probably will be a year before a proper evaluation can be made. It may well turn out that some additional changes will be necessary before this operation can be said to be a success.

PERSONNEL SITUATION

There are some complications already, not totally unexpected. Some of the personnel attached to the old Bureaus of Ordnance and Aeronautics, realizing that the merger was in the wind, and worried about their jobs, began looking for employment elsewhere and shifted over to jobs outside these bureaus. Thus, when BuWeps became an actual fact, there were offices here and there that were listing pretty badly. In some cases, Navy officers found themselves doing the work of file clerks and secretaries who had suddenly disappeared in the shuffle. New job descriptions had to be written and civil service approval had to be obtained for job changes. There was a feeling of uneasiness about how one would make out under the new set-up and, understandably, some time was required before things would settle down.

By and large, though, it is probably fair to say that this change is being accepted with better grace than most bureau metamorphoses. It would be hard to find anyone who really believes that things would have been better if left status quo. There is, in this, the feeling that from the standpoint of command and technology this merger was inevitable, plus the recognition that this coalition is undoubtedly a better way for the funding of the new weapon systems and also that greater mileage should develop from combined field activities and laboratories formerly under either BuOrd or BuAer.

Personnel-wise, BuWeps is composed of some 214,-500 people, of which 4400 will constitute the Washington headquarters. The rest, out in the field, will be engaged in such activities as Naval Ordnance Test Station, China Lake, Calif.; Naval Air Test Center, Patuxent River, Md.; Aviation Supply Office, Philadelphia; and Ordnance Supply Office, Mechanicsburg, Pa.

Little change is expected in the functions of any of the field offices although their line of command may be somewhat different in relation to the overall set-up and some of these field stations may undergo a name change. *The number of employees now with BuWeps is roughly about what the total was with both BuOrd and BuAer.* Any change in the manpower picture probably will be in a downward direction but present plans call for nothing dramatic. Any cutback will be accomplished by natural attrition, i.e., not hiring new people for some job posts when they are vacated.

PHYSICAL SET-UP

In Washington, D. C., although there has been quite a bit of puss-in-the-corner office shifting about, the basic geographic structure remains the same with the bulk of the BuWeapons administration facilities being housed in Main Navy, Munition, and the temporary "W" buildings which adjoin each other on Constitution Avenue.

At first, contractors accustomed to dealing with either BuOrd or BuAer may run into some confusion but there seems to be general agreement that eventually things should be improved for the people doing business with BuWeapons, at least from a purely paper-work and time-saving standpoint. Many a contractor, in the past, has had to contact both BuAer and BuOrd on a single project matter. Now he'll be dealing with one agency and this should cut down on red tape and duplications, one of the main ideas in setting up BuWeapons in the first place.

WHAT DOES THE MERGE SIGNIFY?

More important than any name changing or streamlining are the basic philosophy and concepts involved. There are some noteworthy shifts here, even if perhaps by implication and indirection rather than on the spelled-out surface.

The announced mission, i.e. to more quickly implement an idea from its initial inception to the final product, is something that would apply to any bureau, old or new, and it may be that BuWeps will be able to achieve this in more areas than BuOrd or BuAer could individually. But, there is a significance beyond this, too.

It emphasizes, as much as anything could, that the Navy has committed itself to the space and missile age. Otherwise, the need to create BuWeapons wouldn't have been nearly as imperative, if at all necessary. It almost might have been called BuMissiles or BuSpace, although BuWeapons also will be involved in any and all armaments (from the simplest pistol on up), *even in things that might not be directly connected to weaponry* but more to naval operations in general. For instance, it has been instrumental in the procurement recently of light Piper personnel transportation planes. And, while these planes might actually be used quite often to transport brass to speaking engagement sites, etc., they could also be used to transport men from base to base in connection with some kind of naval exercise or operation. The hard corps of scientists, engineers, and technicians who were with BuAer and BuOrd remains with BuWeps and it would be silly for the Navy not to take advantage of them in appraising certain products and items that fall within their specialized kens, whether it be a light transportation plane or a lubricating oil.

The creation of BuWeps means, fundamentally, that the Navy is banking heavily on the missile to maintain its place in the military scheme of things. It also means that USN is going to be more conscious than ever of the research end of things, the only way to keep free of the quicksand of obsolescence in the missile race.

Something else inherently involved in all this is that Navy still feels itself very much concerned with space, as such, in the purest abstract and scientific sense as well as in the practical applications thereof. *As far as Navy is concerned, it has as much right as anybody to land the first military expedition on the moon . . . and, if that should happen, it would be a BuWeps project that would do it.* ∎

NAVY LOOSENS GRIP ON CONTRACTS

The Bureau of Ordnance and the Bureau of Aeronautics were fused by the Navy into the Bureau of Weapons in order to maintain a better grip on development and procurement of naval muscle hardware· in actual fact, the new bureau is relaxing its managerial hold on things.

It had been the Navy's wont to keep a tight rein on all its contract production. No other service had been so fussy, so literal minded, so unbending about its specifications and aims. It felt it had just cause for this. It was oriented toward the ocean and things that were tolerable on terra firma were not acceptable among the restless waves of the changeable sea. The Navy figured it knew more about this sea and its ways than anyone else. There was also the fact that its equipment, no matter how complex in design, had to be simple to operate, repair, and maintain because you don't man your ship with a crew of Einsteins and von Brauns but rather ordinary fellows known as sailors, most of them with only a high school education at best, and you can't shout for help to a plant on Long Island or in Dallas when something breaks down in the China Sea.

So the Navy made itself the supreme management of any contract project of any size and ran the show and called the tunes from inception to the final turn of the final screw. Now, Navy is beginning to release its iron hold on these projects and give the private concerns doing the work more of a say in running things.

The Navy is relinquishing its tight control policy over its contracts reluctantly and only as a matter of sheer necessity. Modern armament has become so complicated and elaborate that the Navy simply doesn't have the staff to ride herd over everything. *It is going to have to rely more on the supervision of the contractors.*

As a matter of fact, for the first time on a major contract with anyone, Navy has actually bestowed the title of "Management" on North American Aviation in the development and production of the A3J, the new jet bomber, and it is doing the same thing with Bendix in its work on the EAGLE, Navy's new air-to-air missile being developed.

EXPECTED REACTIONS

If the Navy had sometimes given this contractor or that a hard time, Congress was by no means put out by any of it. Capitol Hill appreciated an agency's keeping on top of a situation, dotting every *i*, crossing every *t*, and making sure every penny is well and properly spent. It shuddered at Defense Department contracts that seemed to give a "blank check" to companies. There will be some in Congress who will not feel too happy about this relaxation on the part of Bu-Weps.

The primes aren't going to be at all unhappy about this change because, human nature being what it is, no one likes to have somebody breathing down his neck all the time. These concerns are going to feel that now they can use their own judgment more: do things more their own way, handle things more efficiently, do a better all around job, and cut costs in the process too.

As far as subcontractors go, their attitude no doubt will depend on whichever side of the fence they happen to be sitting. If they've been receiving Navy contracts regularly, they aren't likely to feel too jubilant about the primes now being free to go to whomever they may want to get some job done. On the other hand, sub-contractors who have been on the outside looking in, now can grin a bit and say, well, glory be, maybe my day has come at last!

NAVY WILL STILL SUPERVISE

You would be jumping somewhat to conclusions though if you thought that the Navy had suddenly gone "soft." *Navy probably still will be the toughest of the services to deal with contract-wise.* The best way to report what is happening may be to say that something of a thaw has set in and there would seem to be factors that indicate this tendency will continue.

While it is true that the Navy has begun to actually designate contractors as the "Management", it still intends to keep a pretty close eye on operations. And while it may be a fact that the primes are going to have more leeway in selecting their subs, there probably aren't going to be many concerns that will stick their necks out if it is plain that the Navy would prefer one sub-contractor over another.

It goes without saying that the Navy is going to be as tough-minded as ever when it comes to end results. It isn't going to be any more tolerant about performance and specifications than it has been.

GFE & CFE POLICIES

In the past, the contract area between a concern and the Navy was divided into two areas: GFE and CFE. Translated, this means *Government Furnished Equipment* and *Company Furnished Equipment*. Heretofore, the Navy invariably handled all the major items. On a plane, for instance, such things as radar equipment, navigational features, etc. were GFE matters. A company would then sub-contract for the tires, the windshield, etc. The GFE and CFE set-up will continue under the new policy too, but the emphasis is going to lean toward the *C*FE end away from the *G*FE.

All in all, this is going to be something of an experience for the Navy as well as its contractors. For the Navy is, as a matter of fact, going to be a little less in the picture than before. If it turns out that companies can handle their jobs well by doing things their own way, then the Navy might feel more and more disposed, as a matter of good sense and good business, to allow companies to take an increasingly dominant role over development and production. Before it is all over, the Navy might actually find itself liking the "don't-go-too-near-the-contractor" policy. ■

R/ADM PAUL D. STROOP

R/ADM W. F. RABORN, JR.

FEATURE ACTIVITY DATA

PROFILES

REAR ADMIRAL PAUL D. STROOP
Chief of the Bureau of Naval Weapons

THE STROOPS are strictly a Navy family. Son Michael is a LTJG attached to USS CUBERA. Daughter Margaret Ann is married to LCDR John Well, currently attached CNO, daughter Barbara has as husband LT. John Droddy, assigned to USS GROUPER.

The Admiral is an avid gymnast, was on the 1928 U. S. Olympic team. Also is quite a golfer and swimmer, goes in for hunting and fishing too.

Born in Zanesville, Ohio, 30 Oct. 1904, Paul Stroop was graduated from the Naval Academy in 1926, first sea duty was plotting room officer aboard USS ARKANSAS. Became Naval Aviator in 1929, participated in 1931 tests in Chesapeake Bay which proved the accuracy of famed Norden Bombsight, which was to give the U. S. unrivaled superiority in the field of horizontal bombing during World War II.

Stroop was attached to a bombing squad based on the RANGER, also LEXINGTON. Commanded seaplane tender MACKINAC in World War II, the carriers PRINCETON and ESSEX during the Korean conflict.

Shore duty assignments include command of the Ordnance Test Station, China Lake, Calif.; Senior Naval Member of Weapons Systems Evaluation Group, duty with Assistant Secretary of Defense in Research And Development. Also had duty in BuAer and served as Chief of BuOrd too. It was while in this capacity that he was chosen to become first head of the new BuWeps.

REAR ADMIRAL WILLIAM F. RABORN, JR.
Director of Special Projects, Bureau of Naval Weapons

A TEXAN, he was born 8 June 1905, has no children but could be called "Father of the POLARIS." Attended high school at Marlow, Okla., entered the Naval Academy in 1928. Is married to the former Mildred Terrill, who was a CDR in the Naval Nursing Corps.

Designated Naval Aviator 1934. Served in battleships, destroyers, carriers. Established U. S. Naval Aviation Gunnery School, Pearl Harbor, 1940. Exec of HANCOCK in Fast Carrier Task Forces, Pacific. CO, BAIROKO, 1950-1951. Chief of Staff to ComTaskForce 58 and ComCarDiv 2, Western Pacific. BuOrd, R&D, Guided Missiles. Deputy Director, Guided Missiles Division, CNO. CO, USS BENNINGTON. Assistant Chief of Staff, U. S. Atlantic Fleet. 1955. First Director of Fleet Ballistic Missile Program—"POLARIS"—1955-present.

Recently awarded the Rear Admiral William S. Parsons award for Scientific And Technical Progress.

A Baptist, Adm. Raborn has no real hobby as such but is active in fraternal circles and is a Master Mason.

REAR ADMIRAL WILLIAM A. SCHOECH
Deputy Chief, Bureau of Naval Weapons

ADMIRAL SCHOECH probably has most mispronounced name in Navy. You say it S-h-a-y.

Born in Blakesburg, Iowa, 17 Oct. 1904, Bill entered Naval Academy in 1924. Served for awhile aboard WEST VIRGINIA, became Naval Aviator in January, 1931. Served as pilot of Observation Squadron 3 aboard TENNESSEE.

R/ADM W. A. SCHOECH

R/ADM E. F. METZGER

R/ADM M. A. HIRSCH

Studied aeronautical engineering (structures) not only at Naval Postgraduate School but California Institute of Technology.

Became Operations Officer at Naval Air Station, Seattle, during World War II served as Chief Staff Officer to Commander, Aircraft, Seventh Fleet. Served as Director of Aviation Training on the staff at Jacksonville, Fla., for awhile. Assumed command of Asiatic Wing, Naval Air Transport Service in 1945.

Became assistant chief of BuAer (R&D), then served as Commander Carrier Division THREE. From that post was selected as Deputy Chief of BuWeps.

Admiral Schoech likes to play golf, is married to former Barbara Bennie of Birmingham, Ala., has three children, Barbara Sinclair, William Walter and Joseph Andrew. Still a country boy at heart, lists his official address as old hometown, Blakesburg, Iowa.

REAR ADMIRAL EDWARD FRANCIS METZGER
Assistant Chief for Contracts, Bureau of Naval Weapons

BORN JULY, 1910, Lynn, Mass., entered Naval Academy in 1933. Married Violette Manuel of Crescent City, Calif. Served on cruiser LOUISVILLE for a couple of years. Has been an officer in the Navy Supply Corp from 1937 on, until appointment as head of the Contracts Division, BuWeps.

Between 1939 and 1941 was Assistant to the Supply Officer, Storage Group Officer and Officer in Charge of the Submarine Supply Center at Naval Shipyard, Mare Island, Calif. Was awarded the Bronze Star Medal for "meritorious service . . ." while serving as Force Supply Officer on staff, Submarine Force, Pacific, during 1944 and 1945. Later was officer in charge of Purchase Division, Bureau of Supplies and Accounts.

Admiral Metzger was the officer in charge of Navy Purchasing Office, London, from 1955 until 1957, after which he served as Assistant Chief of BuSanda for Transportation. Also served as Assistant Chief of BuSanda for Supply Management. As current Assistant Chief for Contracts at BuWeps he is most important man in Defence contractor selections.

REAR ADMIRAL MORRIS A. HIRSCH
Assistant Chief for Fleet Readiness, Bureau of Naval Weapons

ADMIRAL HIRSCH came up from the ranks. Born in Franklin, Pa., 28 May 1908, he attended Temple University before enlisting as Seaman Second Class. Was commissioned Ensign in Reserve, transferred to regular Navy status in 1939 as Lieutenant.

Was designated Naval Aviator in 1930. Attached briefly to USS WRIGHT, then to Scouting Squadron 6 on RALEIGH.

Released to inactive status, became Chief Test Pilot and Assistant General Manager of Lee Motors Corp., Collegeville, Pa., manufacturers of aircraft and high powered speed-boat engines, for awhile also operated commercial flying schools at Philadelphia and Camden, engaging in student instruction, aerial photograph, charter services aircraft sales and services.

Returned to Navy for duty in 1934 at Naval Air Station, Pensacola. Served as Flight Instructor, Personnel Officer, Assistant Assembly and Repair Officer, Engineer Officer, Officer In Charge of Instrument Flying, Planning Officer for Assembly and Repair Department.

Reported in 1941 aboard LEXINGTON at Pearl Harbor, was attached to carrier when it was sunk in Battle of Coral Sea, won Letter of Commendation with Ribbon and Combat V not only for part in directing rescue and removal of wounded but because "at great personal risk, he made tests of the temperatures of the torpedo warheads which were exposed to nearby fires."

Reported to BuAer, serving as Director of Production, also, later, as Director of Fiscal Division. Joined staff Naval Air Force, Pacific Fleet as Material Officer. From that post was appointed head of BuWep's Fleet Readiness Support.

Married to the former Lucille Farrel of Louisville, has a son Donald, a daughter, Nancy Lee.

Admiral Hirsch is a power boating and power automobiling enthusiast, has a prediliction too for Broadway show tunes, sops up all sorts of factual literature, particularly with scientific-business management slant, hopes someday to wind up in Hawaii. ■

CHANCE VOUGHT SBU-1 scouting bombing plane. USN photo released 9 Sept. 1935. This BuAer procured aircraft boasted latest in controllable cowl. No cumbersome radar, MAD gear, or sonobuoys to bother with on ASW patrols.

SLEEK F8U-1 CRUSADER aircraft built by Chance Vought operate from Sixth Fleet carriers in the Med. These four are based aboard the USS FORRESTAL (CVA-59) and come aboard the FORRESTAL's 720-ft. runway at about 140 mph.

TIP SHEET ON BUWEPS CONTACTS

and

JOB DESCRIPTIONS OF KEY BUWEPS POSTS

Suppose you had been dealing with a Mr. Jones at the Bureau of Ordnance, and/or a Mr. Johnston at the Bureau of Aeronautics . . . who do you deal with now that these two bureaus do not exist but there's a Bureau of Weapons instead?

The answer is— Mr. Jones and Mr. Johnston.

In other words, you should endeavor to continue contacting the same people you had all along before the change.

If you've been contacting BuOrd or BuAer people out in the field, the chances of you continuing your liaison with these individuals without a bobble is very excellent indeed. Little if any change is anticipated within the 325 facilities and laboratories in the field that were under either BuOrd or BuAer. About the only difference is going to be that they'll be under BuWeapons now.

If you're starting from scratch with BuWeapons, the thing to do is go to Room 1085, ground floor, 19th Street entrance to the Main Navy Building. There will be people on duty there to help you make proper contact.

If you are there on official business, you'll find a secure stowage facility there for the temporary checking of classified matter. Overnight stowage of classified matter here makes it unnecessary for the visitor to find secure non-Government facilities.

The reception room will be manned on a 24 hour basis. During work hours (8 a.m. to 4:30 p.m.), Bureau of Naval Weapons civilian personnel will provide the service. During non-work hours, a military duty officer will handle things. ■

ASSISTANT CHIEF FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Asst. Chief/RDT&E is directly responsible for the complete development of aircraft, weapons and associated equipment. This responsibility extends through the evaluation phase to the point where complete design disclosure information is made available to the offices for *Production And Quality Control and Fleet Readiness.* Engineering of operational aircraft and weapons remains under the cognizance of the office of RDT&E insofar as changes concerning safety, reliability and operability are concerned.

RDT&E is composed of four main sub-divisions: (1) *Aircraft,* (2) *Missiles,* (3) *Anti-Submarine Warfare,* and (4) *Astronautics.* Each of these groups includes supporting component divisions representing a merging of the skills of the two old bureaus in these areas. *Each group will be headed by a Research & Engineering Officer in charge of basic and applied research, general engineering, materials development, systems analysis and evaluation, and a Ship Installations Officer, in charge of the final integration into ships of developed aircraft, weapons and associated equipment.*

Each group has a staff of project officers which coordinate the systems effort of the component divisions. These projects officers are the principal points of contact for the exercise of program direction and coordination by the Program Management group.

RDT&E is responsible for basic research as well as any applied research in any field that may be applicable to naval warfare.

DATAGRAM

AIR/SPACE DATA

U.S.-U.K. SCIENTISTS AGREE ON JOINT EXPERIMENTS

At NASA meeting, reps from U. S. and Great Britain reached agreement on 6 experiments which a joint U.S.-U.K. Earth Satellite will carry. First joint experiment planned for late 1961. ///NASA/

AF CUTS B-58 IN ECONOMY MOVE

Orders on Convair bomber cut for second time to 20 planes ($20 million a copy.) ///Army Info/

DOAK VTOL ACCEPTED BY ARMY

Model 16 (designated VZ-4DA), a vertical take-off and landing a/c accepted for short runway operations. Ducted fan propulsion system to be adopted by manufacturer for transport use. ///Army Info/

NAVY TO USE AZTEC FOR UTILITY RUNS

Economy dictates use of this Piper rather than higher-operating-cost utility a/c now in inventory. ///Navy/

GE PROCESS PRODUCES BETTER ENGINES QUICKER

Rocket engines at Aerojet, Sacramento are brazed in a sealed retort over which a "bell" containing heating elements is lowered. The engine within the retort is surrounded by pure, dry hydrogen atmosphere; area between retort and furnace bell is filled with exothermic or hydrogen gas to protect heating elements which would corrode if exposed to air when heated. ///Aerojet/

MORRISSEY 2150 PUT INTO MASS PRODUCTION

2-place utility plane manufactured by Shinn, Santa Ana, Calif. is all metal with fiberglass tips. Price tag: $8,245. ///Shinn Engineering/

COMMUNICATIONS/ELECTRONICS DATA

SIGNAL CORPS TESTS AIR-LAID WIRE

M-8C wire dispenser fitted to helicopters makes it possible to lay telephone lines at rate of 1 mile of wire per minute. Solves problem of communications where terrain or enemy jamming make radio communication unreliable or impossible. ///Army Info/

WEATHER BUOY RADIOS INFO TO NAVY

Anchored in 11,000 ft. of water 300 miles south of Miss. River, buoy radios info to Navy stations in Gulf area on weather. ///Navy/

PHILCO DEVELOPS TRANSISTOR TWS

Transistorized track-while-scan system displays tracked object on screen while aircraft identities, velocity heading and similar info are displayed on air traffic controller's console. ///DATA/

LORAN-C SYSTEM SUCCESSFUL

New outgrowth of pulsed-type radio navigational systems developed by Jansky & Bailey has proven highly precise at "position fixing" although 1,000-1,400 nautical miles away from transmitter. ///DOD/

GROUND SUPPORT DATA

ARMY UPDATES TANKS WITH MISSILES

Use of small atomic bomb in future warfare necessitates adequate cover for troops, i.e. tanks, therefore anti-tank weapons must be developed. Army has considered SS-10 and SS-11 but most likely missile may be COBRA, first tested by USMC. Method of launching missiles poses problems. ///GSE/

USMC TESTS ITALIAN ANTI-TANK WEAPON

In line with new policy of out-of-house search when necessary, Marine Corps is testing an 105mm pack howitzer of Italian make for use on close support missions or anti-tank weapon. Two howitzers have been obtained, one of which will be loaned to the Army for evaluation. Both USMC and Army are considering COBRA, anti-tank missile of German make. ///DOD/

LOGISTICS/MATERIALS DATA

COLLAPSIBLE FABRIC FUEL TANK

Goodyear for Army: a collapsible 50,000 gal. fuel tank fabricated of 2-ply nylon cloth coated with synthetic rubber. Can be rolled and packed for transport in canvas carrying case. ///DOD/

AUTOMATIC SPRAY ADHESIVE BY 3M

Minnesota Mining & Manuf. has high-strength-oil-resistant elastomeric base adhesive which can be sprayed automatically for volumn production operations or hand applied. For bonding wide variety of porous and non-porous materials. Designated EC-1390. ///3M/

PAPER STRENGTHENS PLASTICS

Teflon, a plastic reinforced by extremely fine fiber, manuf. by Rogers Corp., Conn., performs well at elevated temps. ///Rogers Corp./

MISSILE DATA

ARMY PLANS FOUR NEW MISSILES

Missile A: short range, solid propellant, for battle use.
Missile B: division use, to replace LITTLE JOHN.
Missile C: similar to SERGEANT, corps use.
Missile D: might be successor to PERSHING, a support train which is not yet operational. ///Army Info/

PERSHING BY MARTIN

Self-supporting missile, a REDSTONE replacement kept under wraps by Army. Will consist of 4 track-laying, self-propelled armored vehicles as compared to 20 in REDSTONE. The first carries transporter erector-launcher; second, fire-control pack; third, communications pack; fourth, nose cone and miscellaneous gear. All can readily be removed from vehicles for helicopter or air transport. ///Army/

LACROSSE FIRED SUCCESSFULLY

U.S.-Canadian team fired missile under Arctic conditions. Missile operates in manner similar to game of lacrosse: is launched from rear area and thrown forward, picked up by observer in forward area and directed to target. Highly accurate and mobile. ///DOD/

RAYTHEON AWARDED HAWK CONTRACTS

Army awarded $35,271,000 contract for maintenance, construction, and engineering of this bird. ///DOD/

PROPULSION DATA

QUICK-MIX: ON-THE-SPOT SOLID PROPELLANT

Rocketdyne's unit mounted on 30 ft. trailer truck can produce min. 500 lbs./hr. Grand Central Rocket Co. has similar unit - safe, continuous, automatic emergency system. ///DATA/

ATOMIC FUEL GAGE HIGHLY ACCURATE

Developed by Atomics International for Navy: measures all types of solid and liquid propellants; is not affected by impurities in fuel; discriminates bet. hydro-carbon and petroleum based fuels. Operates on gamma rays. ///DOD/

LOCKHEED BUYS INTO GRAND CENTRAL ROCKET CO.

Lockheed has bought 50% interest in Grand Central Rocket Co., Redlands, Calif., nation's fourth largest firm in solid-propellant field. GCR is working on high-energy propellant for Nike-Zeus program; developing an escape rocket for Project Mercury man-in-space program; and doing concept work for NASA on terminal stage motors for deep space missions. ///Lockheed/

DEADLINE DATA

ASW FIRE CONTROL SYSTEM BY SPERRY

Mark 18 angle solver, completely transistorized, dvlpd under subcontract with Westinghouse, Balto. to be used to control ASTOR torpedo. ///DOD/

SKY ROAMERS PROVIDE PLANES FOR BUSINESSMEN

Based at Lockheed Air Terminal, Calif., this group provides and maintains planes on a co-op basis for small businesses who need planes for travel but cannot justify the expense of private plane. ///Flying/

FOR THOSE OF YOU WHO READ . . .

"Aeronautical Dictionary", compiled by NASA, defines 4,000 aeronautical terms. On sale for $1.75 from Superintendent of Documents, Government Printing Office, Washington 25, D. C. ///NASA/

FLASHLIGHT BATTERY OUTWEARS CASE

Sonotone producing batteries which fully recharge overnight when plugged into household outlet. Retail price: $7.95. ///Sonotone/

WEATHERVISION: YOU CAN TALK BACK

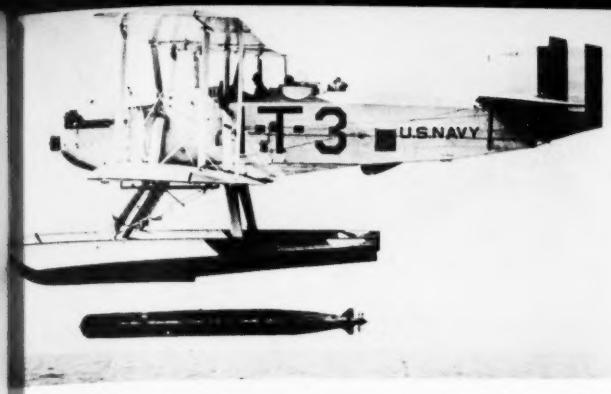
This navigational aid used in airfields gives weather reports on TV with an intercom set-up so you can talk back to forecaster and ask specific questions. ///Flying/

AEC SAYS YES TO REACTOR BIDS

AEC gave nod to Fluor Corp. for architect-engineering bid at Experimental Organic-Cooled Reactor, Idaho Falls, Idaho. Atomics International (div. of NAA) subcontracted nuclear portion. AI will also construct research reactor at Walter Reed Medical Center, Wash., D.C. ///AEC/

HOT WIRE DATA

MISSILE A, Army's newest, will need more ground support equipment from industry . . . Krupp interests reported ready to invest $80 million in steel mill in Manzanillo, Mexico, to take advantage of native supplies of iron and coal . . . U. S. to relinquish air and naval base facilities in Morocco in near future . . . U. K.'s Black Knight missile successfully tested in Australia for speed, altitude, and accuracy of planned point of impact . . . Norway to receive HAWK missiles from U. S. in addition to Nike . . . Britain testing jet engine that will pump inert gases into a burning fire, starving oxygen supply, thus extinguishing blaze . . . Army considering U. S. compact cars for staff transportation . . . Jet-powered helicopters are key to increased passenger mileage at lower cost .



SPEEDING AIR-DROPPED "FISH" is sent on its way by USN 1-T-3 aircraft in this Navy photo dated 21 Jan. 1935. BuAer method of designation was changed after this a/c series. Look close and note control cables to elevator are rigged outside fuselage.

COMPARISON IN SCOUT AIRCRAFT SHOWS NAVY HSS-2 helicopter dipping sonar detection gear in Long Island Sound. During this test on 24 Jan. 1960 HSS-2, built by Sikorsky, hovered continuously over one spot for more than three hours.

ASSISTANT CHIEF FOR PROGRAM MANAGEMENT

Asst. Chief/Program Management is responsible for planning and executive direction of bureau programs, including the assignment of resources for their accomplishment. His functions include:

1. Planning and assigning resources of the bureau in money, manpower, material and facilities.

2. Developing and promulgating an over-all bureau blueprint which reflects the broad scope of all the bureau's programs and activities.

3. Formulating and promulgating directives setting forth the essential objectives of the bureau to the appropriate personnel.

4. Directing the implementation of bureau programs.

5. Making changes in the programs as they may become necessary.

6. Evaluating the status of programs in performance, timing and cost, together with reconsideration of the operating requirements in relation to these factors.

7. Keeping the BuWeapons chief appraised of current status of programs.

8. Reviewing and approving budgets, apportionments and reprogramming.

9. Planning and administering the aviation, explosive and industrial safety programs.

ASSISTANT CHIEF FOR MISSILE RANGE AND ASTRONAUTICS

Asst.Chief/Missile Range & Astronautics is responsible for overall coordination, policy direction and administration of all plans and programs dealing with missile range and astronautics. His responsibilities include:

1. Insuring that all the Bureau's plans and programs in missile range and astronautics are fully integrated with overall Navy efforts in this direction.

2. Reviewing financial program planning, budget estimates, relocation of funds, etc., in regards to missile range and astronautics programs.

3. Deciding on requirements and priorities in this area.

ASSISTANT CHIEF FOR PROGRAM AND MANAGEMENT PLANS

Asst. Chief/Program & Management Plans has as his principal job the interpreting and evaluating of requirements from higher authority in the Navy to the Bureau of Weapons.

This includes:

1. Directing the Bureau's planning activity.

2. Determining and establishing the principles, policies and practices to provide the Bureau with an integrated and comprehensive management plan.

3. Analyzing, evaluating and reporting progress and status of Bureau programs.

4. Determining and justifying to higher naval authority the Bureau's resource requirements necessary to accomplish Bureau objectives.

5. Maintaining liaison with other Government planning agencies.

ASSISTANT CHIEF FOR PRODUCTION AND QUALITY CONTROL

Asst. Chief/Production & Quality Control is responsible for the formulation of plans and executions of programs for procurement and production of aircraft, weapons and support systems, including assigned astronautical equipments and systems. Specifically, this includes:

1. Developing of production plans, including price estimating.

2. Implementation and scheduling of procurement and production programs.

3. Continual evaluation and administration of fiscal control of procurement . . . predicting the situation with respect to performance, timing and cost and preparing progress reports.

5. Review of producibility of proposed major equipments.

6. Recommending policies and objectives concerning the Bureau's relations with private industry in the procurement area.

7. Formulation and maintenance of detailed industrial mobilization plans.

CURTISS XF11C-2 sporting 116 pound bomb installation. When accepted by BuAer for fleet service, designator of this aircraft was changed to BFC-2. This aircraft was rated way ahead of its time when this USN photo was snapped on 19 July 1932.

TODAY'S MODERN CARRIER AIRCRAFT are far cry from earlier egg-crate and bed sheet days of Navy aircraft. Here Navy's altitude record-breaker and fastest all-weather a/c the McDonnell F4H-1 is shown in "dirty" condition as it heads down into base leg of landing pattern. USN photo.

ASSISTANT CHIEF FOR FLEET READINESS

Asst. Chief/Fleet Readiness is responsible for the performance of weapons material in the fleet and implements maintenance programs. He is the Bureau's No. 1 contact with the fleet on operational problems dealing with equipment, maintenance, technical training, installation, and supply support. *In order to meet these responsibilities, he has management control over industrial type activities in those BuWeapons field establishments engaged in overhaul, repair, production, storage and outloading of equipment and materials which are in direct support of his mission.*

He also manages Navy-wide programs of photography and aerology.

He has under him five subordinate posts handling major organizational segments:

1. Weapons Engineering Officer, who with five divisions provides technical and engineering capability: Aircraft and engineering; Missiles; Astronautics and Ammunition; Shipboard Equipment Engineering; Fleet Liaison and Aircraft Ground Support.

2. Maintenance Management Officer, who with three divisions provides plans which include technical and management guidance for the Bureau's major maintenance programs.

3. The Supply Management Officer, supported by three divisions, maintains centralized inventory control over BuWeapons equipment and devises supply management programs including the field establishment.

4. Plant Management Officer manages industrial type field installations.

5. Quality Evaluation Officer provides analytical "feedbacks" reporting on the quality and effectiveness of "in-service" equipment and materials being delivered to the fleet.

BUREAU OF NAVAL WEAPONS COMPTROLLER

BuWeps Comptroller not only manages Bureau financing as it develops but *initiates money policies and systems of his own and supervises budgetary planning* and management.

ASSISTANT CHIEF FOR FIELD SUPPORT

Asst. Chief/Field Support is responsible for the planning and providing of shore facilities necessary to support the fleet and training commands in their operational works. *He takes care of such matters as construction, building repairs, improvements, physical security, etc., of these installations.*

He will manage some 210 field activities in all, including 77 naval air stations. Other activities are air training centers, air base commands, fleet weather centrals, Marine barracks, fleet intelligence centers, degaussing stations.

INSPECTOR GENERAL AND ASSISTANT CHIEF FOR ADMINISTRATION

Insp. Gen. & Asst. Chief/Admin. *combines the duties and responsibilities of Inspector General and Senior Bureau Administrative Official into a single office.* The office will provide two inspection teams to stay on top of required inspections. In addition, the office also will provide administrative services to the Bureau which will include management engineering, office services, personnel administration, commuter operations, security, legislative liaison, technical information, scientific history and library service.

ASSISTANT CHIEF FOR CONTRACTS

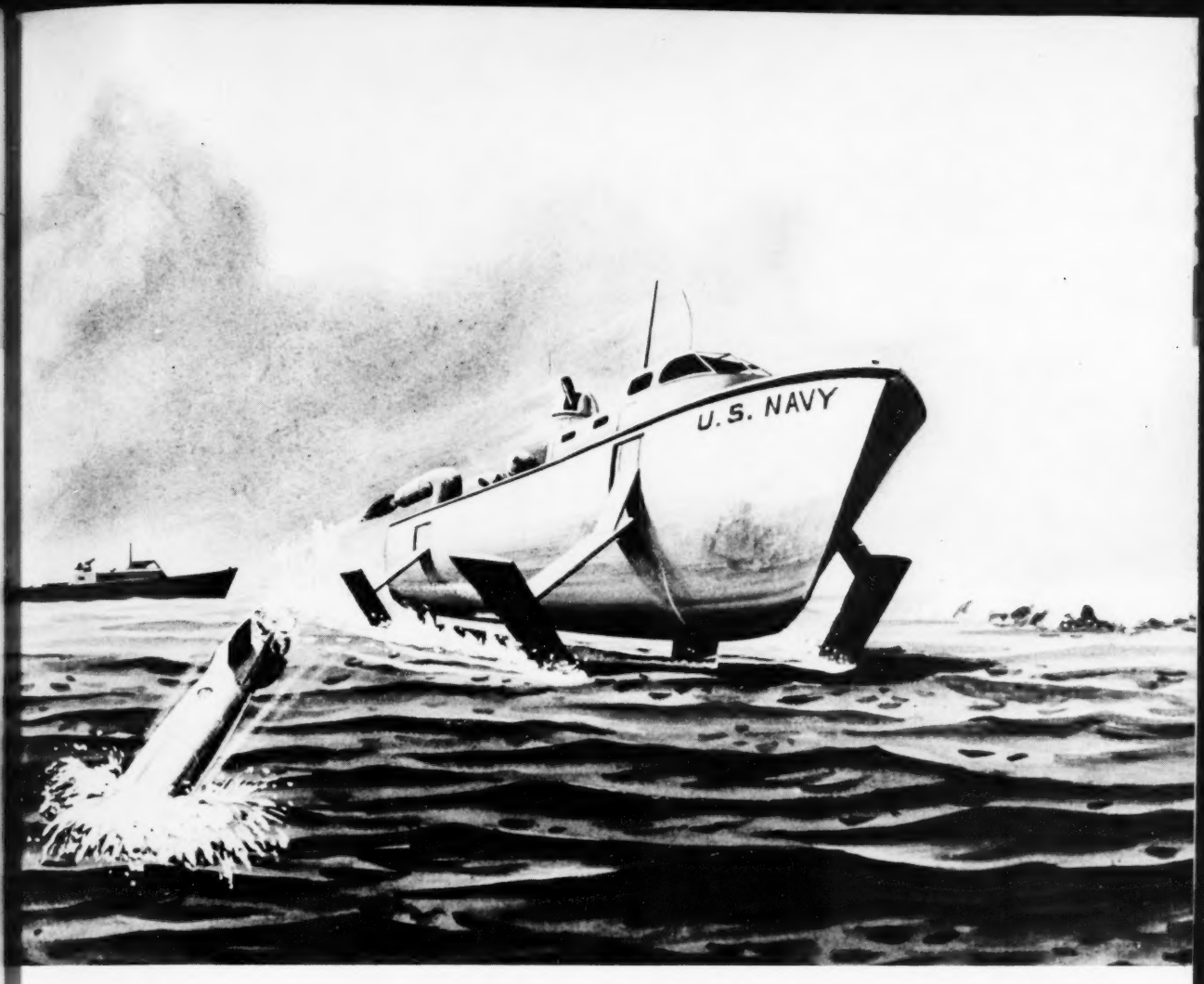
Asst. Chief/Contracts is responsible for performing the contractual responsibilities of BuWeapons. Specifically:

1. Contracting for all naval weapons, aircraft, airborne target drones, photographic and meteorological equipment, astronautic vehicles and equipment, including items that the Army, Air Force, and other Government agencies may want from Navy.

2. Administration of contracts placed by BuWeapons.

3. Termination of contracts.

(These responsibilities do *not* include the contracting for standard aeronautical supplies or electronics items which are assigned to the Aviation Supply Office or Bureau of Ships.) ∎



ARTIST'S CONCEPTION OF THE PC(H), a new concept of a ship in which hydrofoils are used to gain a marked operational advantage in anti-submarine warfare. USN artwork.

ACROSS THE HORIZON

WHAT will the US Navy be like in the coming decade? There is probably nothing so perilous in the military as predicting, but an effort does have to be made to get out the long-range periscope and try to see beyond the horizon.

This is the way Admiral Arleigh A. Burke, Chief of Naval Operations, and the men around him, see the Navy as it will be a decade from now.

There will be six quite independent striking forces instead of the four we have now. Each will be built around at least two big carriers and will consist of powerful new cruisers and ships armed with batteries of missiles, both guided and ballistic. Two of these fleets will be 100% nuclear-powered, or practically so anyway.

There will be approximately 50 POLARIS-equipped subs. Most subs will have built-in silencers to frustrate the enemy. Half of the ships in the Navy will be concentrating on anti-submarine warfare.

Despite more missiles and robot-type planes, there will be as many manned Navy planes in operation as there are today—about 7,000.

It will become more common for destroyers and cruisers to carry helicopters and more and more of these 'copters will be robots, controlled in their flight and operations from the deck of their mother ship.

There should be a number of hydrofoil patrol-type ships in operation before the 1960's are over and, by 1970, all in all, the Navy should have some 950 ships. Strangest of these should be a ship that won't touch

THE FIRST NUCLEAR POWERED GUIDED MISSILE CRUISER, USS LONGBEACH, shown in action in artwork by USN artist.

the waves at all. Navy has begun experimentation at the David Taylor Model Basin with a ship that will ride a foot or so above the water on a cushion of compressed air, allowing it to escape the drag of the waves and undertow. The Navy thinks there is a good chance that such ships, probably of the patrol and LST-type, will be with the fleet before the decade is over.

The Navy has been written off in outer space as far as some people are concerned but here is what Rear Admiral K. S. Masterson, in charge of developing the Navy's guided missiles, says:

"The second era of space exploration which probably will start in the mid-1960's is the realization of new naval capabilities which will employ satellites and space vehicles in a manner not previously contemplated.

"The Navy has done the greatest amount of pathfinding in the applications of nuclear propulsion, as manifested by the dozen or so nuclear ships under construction. This know-how must be applied to the space weapons of the future. In this particular example of a potential future space vehicle, it can be seen that the Navy should be a prime participant in this development.

"The Navy believes it has an integral part to play in the development and fulfillment of the national effort, and particularly of the military space programs. The sea power of this nation will be wedded to usable space power."

In the 1950's there were some people who thought, because of the existence of the atomic bomb and the advent of the missiles, that the Navy would have to become primarily a submarine outfit. No one seems to believe this any more. The Navy enters the 1960's feeling that it is the nation's number one arm, not only in a limited war situation with its carrier-based planes and its Marines, but in an all-out atomic war with the 1500-mile POLARIS missile as well.

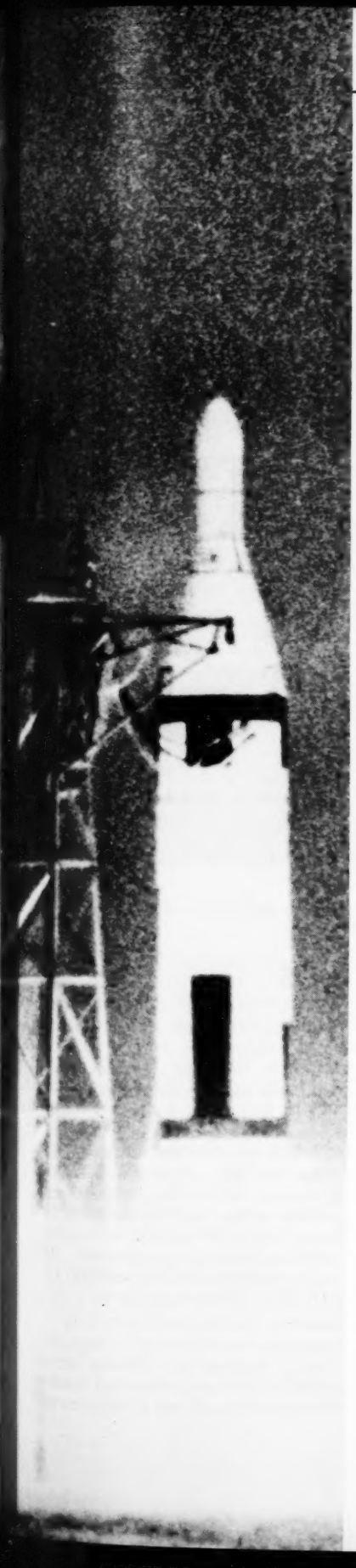
The Navy also sees itself as the number one reason why there probably won't be an all-out war; no country will want to start anything with a strong U.S. seagoing force ready to strike back quickly and determinedly.

But the Navy has problems too. Four out of every five ships in the Navy today are of World War II vintage and becoming worn out and obsolete. The 1960's will see them reaching their 20th year of existence, considered maximum for any ship. The Navy, which has been building 23 new ships a year, hopes to raise the number to 43.

Perhaps the oddest thing that may happen during the 1960's Navy-wise is the come-back of the battleships, all of which are now in mothballs. These big babies are not only hard to sink but they can carry as many as 64 POLARIS missiles each. They don't have the ability to hide, true, but the POLARIS could more than compensate for that.

If the Navy were to point to one ship as "the ship of the future," it probably would be the nuclear-powered cruiser, LONG BEACH, scheduled to join the fleet this year. She will have a tremendous crusing range at full speed and not one, but several, missile systems: two Terrier systems, one Talos system, and could be fitted with the Polaris too. In addition, the LONG BEACH will have ASROC a missile that turns into an acoustic homing torpedo seeking out enemy subs. The new cruiser also is going to be equipped with robot helicopters and with the Naval Tactical Data System which includes a high speed computer to aid split-second command decisions on multiple targets.

All in all, Navy's outlook for the 1960's is one of continued growth and expansion rather than military cut-back. ■



POLARIS

The Navy's Sunday Punch

PERHAPS the most touted weapon of this generation is the POLARIS. Although it still isn't operational, this missile that will fire from a submerged submarine has caught the popular fancy as few pieces of armament have. It has a touch of Buck Rogerishness about it and yet its basic concept, thundering away at an enemy while hidden under the sea, is a simple one to grasp.

The question is—*has the Navy gone overboard on this weapon, making such a to-do about it?*

The Navy doesn't think it has—*but it is concerned that perhaps the public may have gone overboard about it.*

The Navy fully expects that the POLARIS will do what has been claimed for it. It will be fired from underneath the sea. Navy believes the range of approximately 1500 miles which was hoped for will be achieved. Navy is sure POLARIS can be fired accurately and go straight to its intended target. POLARIS will have an atomic-warhead and cause havoc wherever it strikes. And by spacing out subs around the world there will be few if any vital parts of any nation that will be immune to this missile. Furthermore, *the Navy has high hopes that the POLARIS will be able to join the fleet as an operational weapon before 1960 is over.*

But as awesome and magnificent as the POLARIS may be in its own right, there is one thing that this much-publicized missile isn't. *POLARIS isn't versatile.*

Asked if he considered the POLARIS the "one outstanding weapon," the reply of Admiral Arleigh A. Burke, Chief of Naval Operations, was: "Yes and no. People can't put things into nice little categories like that. The POLARIS-carrying submarine, I think, will be one of the most effective retaliatory weapons in the world . . . it has a lot of advantages, *but it can't cook . . . In other words, there are a lot of things it can't do.* When you need a squad of subs in an area, you can have 5000 POLARIS-carrying subs sitting off that area and it won't do a bit of good. *POLARIS-carrying subs are good only for retaliation in a general nuclear war and that is all they are good for."* ■

OH KNOTS!

Aides of Admiral Arleigh Burke, Chief of Naval Operations, have a special rule to follow when they enter his private office: they must first peer at their boss through a small porthole in his door.

The window is not merely decorative. The Admiral has two entrances to his Pentagon inner sanctum and, since sometimes he and other high-ranking brass enter through the back door, the hole enables aides to check on whether or not a high-level conference is going on.

Its importance, however, doesn't seem to be necessarily appreciated by members of the other service branches. In fact, around some Pentagon quarters, Admiral Burke's aides are known as the "Knot Hole Gang."

DUSTY SUBJECT

The Navy thinks it has found a way to eliminate night shifts. Eliminate nights.

This could be done, Navy scientists say, by creating a thick layer of dust in the cosmic region off the earth.

This dust business would be comparable to Saturn's major ring, which is believed to be an area of extremely fine particles about 10 miles in depth, located some 35,000 miles from the planet.

Scientists at the Naval Research Laboratory say that it is likely there is no night on Saturn because this ring reflects a continual brightness from the sun. They believe that this band of dust around the earth would do the same thing.

Now all that remains to be done is figure out a way to sweep all that dust out into the cosmic area, something which no doubt would have the complete support and cooperation of the nation's housewives.

INTERIOR OF MI-4 Soviet helicopter shown on Aeroflot flight from Simferopol to Yalta.

Soviet Helicopters

from Tekhnika Molodezhi—Dec. 1959 Issue

Photos Courtesy Teknika Molodezhi, Moscow

DATA readers may be interested to know something of the three trends that now predominate in Soviet helicopter designing and engineering. They are fathered, respectively, by Chief Designers M. L. Mil, A. S. Yakovlev, and N. I. Kamov.

SINGLE ROTORS BY MIL

M. L. Mil heads the single-rotor trend. His Mi-1 model has a tail end unit and the rotor is driven by an A. G. Ivchenko AI-26V 570hp engine. The Mi-1 first appeared in 1948 and was put into service in 1950. Mi-1 has a comfortable cabin for the pilot and three to four passengers. With full payload it can develop a speed of up 200 km per hour *(125 mph)* and reach a height of more than 5300 meters *(17,225 ft.)*.

A new Mil model, the Mi-4, was brought out at the end of 1952. It was soon put on the conveyor line and turned out as a multipurpose machine. Now it is used as a passenger, freight, agricultural, ambulance, and mail craft, as well as a crane for hoisting and conveying suspended loads. The Mi-4 is equipped with an A. D. Shvetsov and P. A. Solovyov ASh-82v 1700 hp engine, has a payload capacity of 1200 kg *(2645.52 lbs.)*, and is roomy enough to carry a GAZ-69 or Pobeda motor car. Its passenger version comes with a comfortable heated and ventilated cabin, a toilet room and baggage compartment. It can carry 11 passengers and 100 kg *(220.46 lbs.)* of baggage over a distance of 250 km *(155 miles)*, or 8 passengers and 100 kg of baggage over a distance of 400 km *(250 miles)*. Fitted with night and blind-flight instruments and a defroster it

has good pilot and passenger comfort and has shown an admirable safety and performance record.

Later, M. L. Mil produced a new model, the Mi-6, the world's largest helicopter. It has two powerful turbo-compressor engines which by special reduction gear drive a five-blade rotor. With a payload of 39 tons it amply accommodates heavy lorries, tractors and bulldozers, or 70 to 80 passengers, can cover long distances and operate in the remotest parts of the country.

TWO-ROTOR TANDEMS BY YAKOVLEV

The Soviet designer A. S. Yakovlev heads the second trend: two-rotor tandem arrangement which makes it possible to build helicopters of great capacity. His Yak-24 is a powerful boxcar-type machine. Besides carrying freight in its fuselage, its "flying crane" version can hoist and convey large-sized loads of up to 3.5 tons. With its two air-cooled radial engines it can fly at a speed of 175 km *(109 mph)* per hour. The Yak-24 was first demonstrated at an air fly pageant in Moscow in 1955.

COAXIAL TWIN-ROTORS BY KAMOV

The third trend—coaxial twin-rotor design—is headed by N. I. Kamov. Set on one shaft the two rotors rotate in opposite directions at an equal number of revolutions.

His Ka-10, popularly called the "air motorcycle," was developed in the 1945-1948 period and first appeared on an air fly pageant in Moscow in 1949. It is so simple and easy to pilot that it may come into wide use by the general public.

N. I. Kamov's next original model was the K-15. Much larger than the Ka-10 it has a spacious glass cabin with two seats. Equipped with an airplane-type tail unit, it is stable in flight and easy to control. The K-10 comes with a radial 225 hp engine.

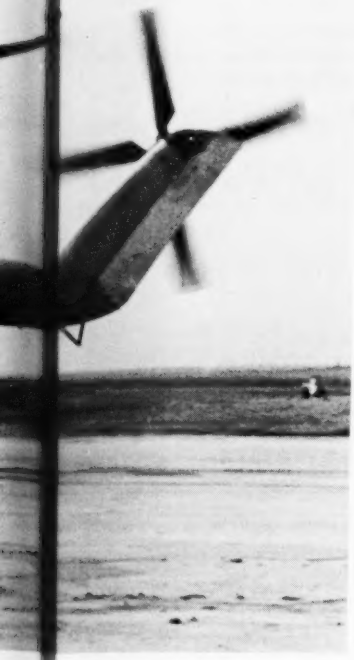
A still bigger model, the Ka-18, is now on display at the USSR Economic Achievements Exhibition. It can carry three passengers or 200 to 250 kg of freight. With a 225 or 275 hp air-cooled engine it can develop a speed of 120 to 150 km per hour.

Such are the three main trends in Soviet helicopter construction. ■

SOVIET R&D

ABOVE: Mi-6, world's largest helicopter, able to carry 39 tons of cargo or up to 80 passengers, shown turning up for take-off. Mi-6 is powered by twin turbines.
UPPER RIGHT: Kamov coaxial twin-rotor Ka-15 shown hovering behind Sever-2 aero-sleigh which is used in extreme North and Far East.
MIDDLE RIGHT: Mil Mi-4 shown as Soviet crew pulls off "tarps" to get ready for flight in the Arctic night.
BELOW: These are views of the USSR's currently most used helicopter, the Mi-4 which is quite similar to the U.S. Sikorsky S-58. From left to right: (1) Passengers board Aeroflot version of Mi-4 at Adler airport for flight to Sochi. (2) Another Aeroflot Mi-4, this one with wheel skirts, shown on take-off skimming over Il-18. (3) Aeroflot Mi-4, same one shown as ground view extreme left (note number on boom) coming in for landing. Tail-low technique on landing is same as attitude used by U.S. chopper pilots.

Photos by S. Preobrazhensky, V. Kivrin, and B. Vdovenko of the magazine Technika Molodezhi, Moscow.



Soviet Helicopters

DATALOG OF MISSILE, SPACE, AND DETECTION PROJECTS

MILITARY MISSILES, February 1960

★ *New information this month*

AA—Air-to-Air
AS—Air-to-Surface
AU—Air-to-Underwater
SS—Surface-to-Surface
SA—Surface-to-Air
SU—Surface-to-Underwater
UU—Underwater-to-Underwater
ICBM—Intercontinental Ballistic Missile
IRBM—Intermediate Range Ballistic Missile
ECM—Electronic Countermeasures

ASROC

Type: SU
prime: Minn.-Honeywell

★ Solid rocket-powered nuclear torpedo. Sked. for fleet use early '61.

ASTOR

Type: SU
prime: Westinghouse

★ Few people know the sad story of how this clever, yet simple wire-guided nuclear torpedo was designed and dvlpd by the Vitro Corp., and then, after Vitro bought a place to do the production work, the production contract was awarded to Westinghouse.

ATLAS SM-65 AF

Type: ICBM
prime: Convair
guide: GE/Burroughs/Am. Bosch
power: Rocketdyne
weight: 260,000 lbs.
length: 75 ft.
dia: 10 ft.
range: 5500 naut. mi.

★ Biggest news in February concerning ATLAS is its increased reliability. Seven ATLAS launchings since Sept. 1959, all completely successful, raised ATLAS favor in Pentagon and White House. Convair, natch, is pleased. Total score to date (Feb. 15, 1960) is 43 total ATLAS firings: 27 successful, 8 partial, 8 failures.

AUTOMET Army

Type: SS
No contracts announced.

★ Solid propellant close support missile. Proposed for "shoot and scoot" Army set-up is now in test stage.

ALBM (SKY BOLT) AF

Type: AS
prime: Douglas
guide: Nortronics
power: Aerojet
range: 1000 mi., a/c launch

★ In speech before Nat'l. Press Club 12 Jan. Gen. White revealed 1000-mi. range of SKY BOLT, said it would be great SAC aid. Test flights in process.

BOMARC IM-99 AF

Type: SA
prime: Boeing
guide: Westinghouse
power: A—Marquardt
B—Thiokol
funding: $421.5 million on BOMARC-B in FY 61
speed: Mach 2.7
range: 500 mi.

★ Model "A" operational is ramjet powered and has been receiving criticism. New Model "B" with solid booster expected to be much better.

BULLPUP ASM-N-7 Navy
GAM-83 AF

Type: AS
prime: Martin
guide: radio command
Republic
power: Thiokol
weight: (ASM-N-7) 250 lbs.
range: 4 mi.

★ Operational with Atlantic and Pacific Fleets. Very simple radio command weapon. WHITE LANCE GAM-83 is larger model now in development for AF use. Pre-packaged liquid motor very popular.

CLAM AF

Type: AS
No contracts announced.

★ Counter measure low altitude missile listed in AF missile specifications book.

CLAYMORE Army

Type: SS
No contracts announced.

★ Anti-personnel weapon of short range. Designed for troops in field.

COBRA Navy

Type: ECM
No contracts announced.

★ Proposed missile to confuse enemy ship-based radar. Project lagging. Name may be changed.

COBRA USMC

Type: SS
prime: Boelkow Entwicklunger, W. Germany (distrib. U.S.: Daystrom)
guide: wire guided
power: Solid BE
weight: 24.6 lbs.
speed: 191 mph.
range: 1 mi.

★ Anti-tank missile now operational with W. German forces being purchased by USMC for evaluation. 100 purchased by USMC in initial order. Army also plans evaluation.

CORPORAL SSM-A-17 Army

Type: SS
prime: Firestone
guide: Gilfillan
power: Ryan
range: 75 mi.

★ Phasing out in favor of SERGEANT. NATO troops using, some US forces in Europe still have CORPORAL.

CORVUS ASM-N-8 Navy

Type: AS
prime: Temco
guide: Texas Instrument
power: Reaction Motors
range: 100 mi.

★ New model being dvlpd as countermeasure (ECM) bird. First fired July '59. Tests continuing with carrier a/c launching.

DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS (2nd Sheet)

MILITARY MISSILES, February 1960

★ *New information this month*

CROW Navy

Type: AA
No contracts announced.
★ Reportedly being dvlpd to fill a need not covered by SPARROW III. Flight tested.

DAVY CROCKETT Army

Type: SS
prime: Rock Island Arsenal
★ Bazooka-launched field weapon with low nuclear yield. Can be hand-carried. Sked to be operational latter part 1960.

EAGLE XAAM-10 Navy

Type: AA
prime: Bendix
guide: Bendix/Sanders
power: Aerojet
range: 100 mi.
★ EAGLE won out in the political battle against GAR-9 FALCON. Navy has high hopes for EAGLE as attack missile launched from carrier a/c appx. 50 miles from target. Provides safety for manned fighters of relatively slow speeds.

FALCON GAR-1, -2, -3, -4, -9, -11 AF

Type: AA
prime: Hughes
guide: Hughes
power: Thiokol
speed: Mach 2.0
range: 5 mi.
★ GAR-3 is operational, SUPER FALCON GAR-3 in test. GAR-9 is radar guided with nuclear warhead. GAR-9 now being cut back in production. GAR-11 is in R&D.

GENIE MB-1 AF

Type: AA
prime: Douglas
guide: unguided
power: Aerojet
range: 1.5 mi.
★ Now being carried by F-89J, F101B and F-106. First operational nuclear warhead air-to-air bird, GENIE is pointed downward at launch, curves up at target. Unguided. Spin-stabilized.

GIMLET Navy

Type: SA
No contracts announced.
This air-launched rocket is said to have high accuracy. Most details, however, are being withheld by Navy.

HAWK SAM-A-18 Army

Type: SA
prime: Raytheon
guide: Raytheon
power: Aerojet
range: 20 mi.
★ Now operational, will be used by both Army and Marine Corps troops against low-level targets. Modified model with better performance now in R&D.

HONEST JOHN Army

Type: SS
prime: Douglas
guide: unguided
power: Hercules Powder
range: 17 mi.
Operational with U. S. forces in Europe. Slated for replacement by LITTLE JOHN.

HOUND DOG GAM-77 AF

Type: AS
prime: North American
guide: Autonetics
power: Pratt & Whitney (J52)
funding: $170 million in FY61
speed: Mach 1.7
range: 500 mi.
★ Few people not closely associated with HOUND DOG realize its true purpose: HOUND DOG is designed to seek out and destroy enemy countermeasure sources, not industrial or conventional military targets. Comparable Soviet missile is said to be USSR's KOMET D.

JUPITER SM-78 Army-AF

Type: SS
prime: Chrysler
guide: Ford Instrument
power: Rocketdyne
★ Operational with Italian and Turkish troops in Europe. The 864th and 865th squadrons of SAC trained with JUPITER. THOR replacing. Will be used as target for anti-missile weapons.

LACROSSE SSM-A-12 Army

Type: SS
prime: Martin
guide: Federal Tel.
power: Thiokol
range: 20 mi.
This weapon is unique in its design to place a very heavy warhead under command guidance on a battlefield target. LACROSSE is under limited production and is operational. Production is being handled by Martin at Orlando.

LITTLE JOHN Army

Type: SS
prime: Emerson Elec.
guide: unguided
power: Allegheny
range: 10 mi.
Designed for "shoot and scoot" operations, LITTLE JOHN will replace HONEST JOHN as an artillery rocket. It will soon be operational.

LULU Navy

Type: AU
No contracts announced.
Air dropped nuclear warhead anti-sub missile is highly classified by Navy. Now undergoing development. No contract announced.

MACE TM-76 AF

Type: SS
prime: Martin
guide: AC Spark/Goodyear
power: Allison (J33-A-41)
funding: $39.8 million in FY 61. No renewal.
range: (B) 1000 mi.
★ Now in W. Germany with U. S. Forces. The "B" model has better performance. Funding ends for MACE in FY 61.

(3rd Sheet)

DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS

MILITARY MISSILES, February 1960

★ *New information this month*

MATADOR TM-61 AF

Type: SS
prime: Martin
guide: Goodyear
power: Allison (J33-A-37)
range: 650 mi.

★ Production has now ceased in favor of MACE. MATADORS being turned over to West Germans and Natl. Chinese.

MAULER Army

Type: SA
prime: Convair

★ Infra-red guided anti-air weapon has been designed for field-troop use.

MINUTEMAN SM-80 AF

Type: ICBM
prime: Boeing
guide: Autonetics
power: Thiokol (solid)

★ MINUTEMAN is expected to become operational by late 1962 or early 1963. Some trouble has been encountered in the single fixed nozzles of the solid propellant motors. MINUTEMAN will be made mobile by RR launch.

MISSILE A

Type: SS
No contracts.
range: 70 mi.

★ Contracts should soon be announced by Army on ARGMA's new 70-mi range field support MISSILE A.

NIKE-AJAX SAM-A-7 Army

Type: SA
prime: Western Electric
guide: Western Electric
power: Hercules Powder
speed: Mach 2.5
range: 25 mi.

★ Operational in U. S., Europe and Far East. Being replaced by NIKE-HERCULES. Non-nuclear.

NIKE-HERCULES SAM-A-25 Army

Type: SA
prime: Western Electric
guide: Western Electric
power: Hercules/Thiokol
funding: $111.4 million in FY 61
speed: Mach 3.2
range: 80 mi.

★ Work continuing rapidly on conversion of NIKE-AJAX sites to NIKE-HERCULES. This fine weapons system appears slated for long retention in our anti-aircraft protection arsenal. Nuclear head.

NIKE-ZEUS Army

Type: SA
prime: Western Electric
guide: Bell Telephone
power: Grand Central Rocket
range: 200 mi.

★ Altho still plagued with difficulties in reliability, NIKE-ZEUS is proceeding to operational status rapidly. Critics say it is too slow.

PERSHING Army

Type: SS
prime: Martin
guide: Bendix
power: Thiokol
range: 700 mi.

★ Testing of the solid propellant PERSHING is scheduled to begin this Spring at Cape Canaveral. It is designed to replace REDSTONE.

POLARIS FBM Navy

Type: US-SS
prime: Lockheed
guide: GE
power: Aerojet
range: 1000 mi.

★ About 40 POLARIS firings are on sked. for 1960. To date (15 Feb. '60) 50 POLARIS Missiles have been launched: 34 successes, 14 partials, 2 failures. Original goal of 1500-mi. range still not achieved. Navy's POLARIS now has Soviet competitor in USSR's GOLEM IV, similar underwater-to-surface missile.

QUAIL GAM-72 AF

Type: AS-ECM
prime: McDonnell
guide: radio command
power: GE (J85)

Air-launched diversionary missile of extreme sophistication and complexity is valuable aid in protection of SAC bombers. Costly QUAIL, also called GREEN QUAIL, is being readied for test flights in near future.

RAVEN XASM-9 Navy

Type: AS
No contracts announced.
range: 500 mi.

★ Proposed air-to-surface range: 500 mi missile now under study. Project appears to be lagging.

REDEYE ARMY

Type: SA
prime: Convair
guide: Convair
power: Atlantic Research

Lightweight (20 lb.) infra-red guided bazooka-type missile well along in testing. Army has high hopes for this relatively inexpensive and effective easily-carried guided missile that can be fired from a soldier's shoulder.

REDSTONE SSM-A-14 Army

Type: SS
prime: Chrysler
guide: Ford Instrument
power: Rocketdyne
range: 200 mi.

★ Now operational with U. S. troops in Europe. REDSTONE being phased out in favor of PERSHING.

REGULUS I SSM-N-8 Navy

Type: SS
prime: Chance Vought
guide: AC Spark Plug
power: Allison (J33)

Although cut in production, REGULUS I is aboard some ships and subs of the U. S. fleet and is operational. Biggest news with REG I, however, is not its current Navy dress but the fact that it has been used in "missile mail" tests by the Post Office Dept.

MILITARY MISSILES, February 1960

★ *New information this month*

REGULUS II SSM-N-9A Navy

Type: SS
prime: Chance Vought
guide: Stavid/Sperry/AC
power: GE (J79)
range: 500 mi.

★ Much more powerful and larger version of REGULUS I, REG II has also been cut from Navy funding but also is being eyed by Post Office Department as speedy ("beyond Mach 2") missile mail carrier that could fly in any weather. Now being used in fleet as target drone.

SERGEANT SSM-A-27 Army

Type: SS
prime: Sperry
guide: Sperry
power: Thiokol
range: 75 mi.

★ Easily assembled in field in about 11 minutes, smaller, more flexible solid propellant SERGEANT is now in production to replace Army's CORPORAL. Nearly operational.

SHILLELAGH Army

Type: SS
prime: Aeronutronics
guide: Aeronutronics
power: Picatinny Arsenal
range: 8 mi.

★ Lightweight missile designed for close-in support of troops. In one application the SHILLELAGH is vehicle mounted. It is designed to be effective weapon against armor, troops and field fortifications. Expected to become operational in mid-1960's.

SIDEWINDER AAM-N-7 Navy GAR-8 AF

Type: AA
prime: Philco
guide: Philco/GE
power: Hercules Powder
range: 7 mi.

★ Extremely popular infra-red homing missile is simple and rugged. SIDEWINDER-1C is advanced model with higher speed and greater range. Advanced model is in test. All-weather version now in R&D.

SKY BOLT AF

★ See ALBM.

SLAM AF

Type: SS
No contracts announced.

★ Supersonic low altitude missile. Contractors now being selected.

SNARK SM-62 AF

Type: SS
prime: Northrop
guide: Northrop
power: Pratt & Whitney (J57)
speed: Mach 0.9
range: 5500 mi.

★ Highly reliable guided winged missile. Subsonic. Operational with AF unit at Presque Isle, Maine. To be replaced by ballistic types.

SPARROW AAM-N-2, -3, -6 Navy

Type: AA
prime: Raytheon
guide: Raytheon
power: Thiokol

★ The SPARROW III with the Aerojet powerplant has been phased out in favor of SPARROW III with prepackaged Thiokol powerplant. In words of R/Adm. Wm. Schoech, Deputy Director of BuWeps, in recent DATA interview: "We are well pleased with SPARROW III with its new power package. As far as my staff and I know it is the finest electronically guided missile in the world and I for one hope to have it in our arsenal for a long time to come."

SS-10 Army

Type: SS
prime: Nord of France
weight: 33 lbs.
range: 0.9 mi.

★ Wire guided anti-tank weapon. Operational with U. S. and NATO forces. Used by the French in Algerian battles with success.

SS-11 Army

Type: SS
prime: Nord of France
weight: 63 lbs.
range: 2 mi.

★ Can be carried and launched by helicopter as well as by troops in field. Operational with French forces. Under study by U. S. Army.

SUBROC Navy

Type: SU-UU
prime: Goodyear
guide: Librascope/Kearfott
power: Thiokol
range: 25-50 mi.

★ This complex weapons system is launched through a torpedo tube of a submarine or surface vessel. Rising, it flies from 25 to 50 miles through the air, then re-enters the water and homes on its submerged target. Key to perfection of the system is reliability and range of built-in sonar equipment. Work is now continuing along that line.

TALOS SAM-N-6 Navy

Type: SA
prime: Bendix
guide: RCA/Sperry
power: McDonnell
speed: Mach 2.5
range: 65 mi.

★ Unique in its integral ramjet body, TALOS is now operational aboard the guided missile cruiser GALVESTON. A new SUPER TALOS is in planning as a possible anti-missile missile for Navy use.

TARTAR Navy

Type: SA
prime: Convair
guide: Sperry
power: Aerojet
length: 15 ft.
dia: 1 ft.
speed: Mach 2.0
range: 10 mi.

★ A miniaturized TERRIER that has performance equal to the larger bird, TARTAR is a 950-lb. beam rider. TARTAR is scheduled to be operational in 1960. Test firings now going on in Pacific waters.

(5th Sheet)

DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS

MILITARY MISSILES, February 1960

★ *New information this month*

TERRIER SAM-N-7 Navy

Type: SA
prime: Convair
guide: Sperry
power: Allegheny
length: 27 ft.
speed: Mach 2.5
range: 10 mi.

★ Beam riding missile for use on larger surface ships, TERRIER is operational with the fleet.

THOR SM-75 AF

Type: IRBM
prime: Douglas
guide: AC Spark Plug
power: Rocketdyne
range: 1500 mi.

★ Now operational, THOR missiles have been sent to the U. K. where they now form 4 units of the Royal Air Force Bomber Command. In its role as a research vehicle, THOR has served as an effective first stage booster, most capably shown in the THOR-ABLE lunar probe combo and has been fired 22 times as a scientific vehicle with 19 successes.

TITAN SM-68 AF

Type: ICBM
prime: Martin
guide: Bell/Am. Bosch/Rem. Rand
power: Aerojet
length: 90 ft.
range: 5500 mi.

★ The spectacularly successful TITAN launching of 2 Feb. 1960, brought new hope and increased favorable public opinion for the TITAN. However, due to increased reliability of ATLAS and earlier stigma of temperamentalness of TITAN, project may still be cut. Program now in critical appraisal.

WAGTAIL AF

Type: AS
prime: Minn-Honeywell
guide: Minn-Honeywell
power: not releasable

This remarkable rocket will be able to follow contours of terrain and change speed in flight. WAGTAIL has been successfully sled-tested.

WEAPON ABLE Navy

Type: SU
No contracts released.
BuOrd "in-house"

Operational with the fleet, WEAPON ABLE is rocket-powered depth charge now installed on destroyer escorts and class 931 frigates.

ZUNI Navy

Type: AS
No contracts released.
NOTS produced.

Operational with carrier based a/c, ZUNI is a folding fin all-weather unguided rocket carried in multiple units. The Douglas AD a/c carry 48 ZUNIs below their wings on combat missions. The weapon is effective against pill-boxes, tanks, gun emplacements and small ships.

SPACE PROJECTS, February 1960

AGENA ARPA

Type: Liquid-fueled Upper Stage
prime: Lockheed
Obj: AGENA will be useable as a second stage to ATLAS and THOR missiles. It incorporates a Bell rocket engine similar to that used previously in the HUSTLER vehicle. The AGENA upper stage is used in DISCOVERER, MIDAS and other projects. AGENA and SATURN are part of PROJECT TRIBE.

ATLAS-ABLE NASA

Type: Large Booster
prime: Convair/Space Tech Labs
guide: GE/Burroughs/Am. Bosch
power: Rocketdyne/Aerojet
Obj: Designed to orbit 200-lb. satellite around moon.

Initial shot in November failed. Similar shots now delayed until late 1960. However, plans now underway for more ATLAS-ABLE vehicles. Much interest in ATLAS-ABLE combo.

CENTAUR NASA

Type: Soft-Land Moon Vehicle
prime: Convair
power: P&W/JPL
Obj: Designed to land 730-lb. payload on moon in soft landing.

★ CENTAUR is first Heavy Duty Space Vehicle. Capable of orbiting a 10,000-lb. satellite payload at 300-mi. altitude or 2500-lb. payload at 22,000 mi. altitude. The 22,000-mi. alt. is significant because at that ht. satellite matches earth rotation and stays over fixed pt. Using 3 or 4 such satellites as radio relay pts. U. S. could have global communications net.

COURIER ARPA (Army)

Type: Communications Satellite
prime: Philco
Obj: Designed to be delayed repeater satellite, part of PROJECT NOTUS.

★ First firing sked. for end of April '60, but project may be cancelled before that time. COURIER now in critical review.

DECREE ARPA (Army)

Type: Global Communications Satellite
prime: no contracts announced
Obj: Designed to be global communications system with satellite repeaters remaining stationary distances from each other.

Part of NOTUS, will be transferred from ARPA to Army eventually.

PROJECT DISCOVERER AF

Type: Stabilized Satellites
Obj: (a) Achieve orbital capabilities of large satellite vehicles.
(b) Dvlp techniques and data for operational military satellite systems.
(c) Recover by use of suitable re-entry capsule for biomedical and other studies.
(d) Execute nonrecoverable advanced engineering tests.
(e) Such other objectives as may be directed.
Tasks: **DISCOVERER** satellites
Prime: Lockheed
Has achieved orbital capabilities and has made successful re-entries. Ejected capsules have not been recovered.
MIDAS Satellites
Prime: Lockheed
In R&D, Early Warning Satellite dvlpd to spot enemy ICBM launchings by infra-red.
SAMOS Satellites
Prime: Lockheed
Originally called SENTRY, first launching scheduled for March 1960.

DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS (6th Sheet)

SPACE PROJECTS, February 1960

★ *New information this month*

DYNA-SOAR I AF

Type: Boost-Glide Orbiting Vehicle
prime: Boeing (for Glider)
Martin (for Booster)
guide: not announced
power: not announced
Obj: Will attempt to put manned glider into orbit for pilot to return.

★ Boeing's space bomber is sked. to be operational by 1970 at current funding. Increasing interest in DYNA-SOAR could put project on crash speed basis and achieve operational readiness by 1966.

PROJECT ECHO NASA

type: Inflatable Satellites
Obj: Global communications experiment.

★ Aluminum-coated inflatable spheres, each as tall as a 10-story bldg., being launched by NASA to use as targets for radio waves. Launching in Jan. 1960 from Wallops Island, Virginia was huge success. More ECHO firings planned.

JUNO II NASA

Type: Large Booster
prime: Chrysler
guide: Ford Instrument
power: Rocketdyne/JPL
Obj: Attempts to put small payloads deep in space.

Five more JUNOs will be fired.

MERCURY NASA

Type: Manned Satellite
prime: McDonnell
guide: not announced
power: ATLAS (Rocketdyne)
Obj: Will attempt to put man in brief orbit, then parachute him in capsule safely to earth.

★ Interest in the MERCURY project seems to be waning. REDSTONE firings with monkeys being recovered have not kindled the American public to flaming pride as was hoped. Manned firings are still a long way off.

MIDAS WS 117L AF

Type: Early Warning Satellite
prime: Lockheed
Obj: Infrared sensing of enemy ICBM launchings.

★ Also part of the original SENTRY program and now handled in the DISCOVERER series. MIDAS has been initiated to dvlp an early warning system of defense against ICBMs wherein the heat from the missile motors is detected at time of launch. Infra-red detection is used. Still in dvlpmnt. MIDAS came to AF via ARPA.

MRS. V ARPA

Type: Maneuverable, Recoverable Manned Space Vehicle
No contracts announced
Obj: Will attempt to place manned vehicle in orbit, then maneuver out of original orbit in space, then return safely to earth.

★ This project is also known as DYNA-SOAR II. Vehicle will weigh in excess of 20,000 lbs. Launch may be from or in space.

NOVA NASA

Type: Large Booster
prime: Rocketdyne
power: Rocketdyne
Obj: Will build 6 million lb. thrust booster for Outer Space Vehicles

★ Rocketdyne's 1.5 million lb. thrust engine is heart of this system. NOVA will be cluster of 4 such engines. Engine in early dvlpmnt now.

Progress in project now lagging.

ORION ARPA

Type: Rocket propelled by nuclear pulses
prime: General Atomic
Obj: Nuclear powered Outer Space Vehicle

★ Work was undertaken in July '58 by Gen. Atomics Div. of General Dynamics under a $1 million contract with ARDC. An additional $400,000 was authorized by ARPA at end of year for continuation of study. In Aug. '59 another $1 million for continuation of nuclear pulse rocket studies was authorized. Moving slowly now from drawing board to basic testing stage.

PRINCIPIA ARPA

Type: Solid Propellants
prime: no contracts announced
Obj: Dvlping new solid propellants with 10-20 percent higher specific impulses.

PONTUS ARPA

Type: Material Research
prime: no contracts announced
Obj: Experimentation and dvlpmnt of better structural and power conversion matls for military requirements in surface, air and missile programs.

SAMOS WS 117L AF (via ARPA)

Type: Reconnaissance Satellite
prime: Lockheed
Obj: TV Satellite

Originally called SENTRY, the SAMOS is part of the DISCOVERER series designed to be a "Peeping Tom" on enemy military capabilities. It is scheduled for initial launch in March 1960.

SATURN NASA

Type: Large Booster
prime: Convair
power: Pratt & Whitney
Obj: Clustered 1.5 million lb. thrust booster for Outer Space Vehicles.

Recently transferred from Army to NASA control along with Von Braun and SATURN project officers and tech people. SATURN with two stages above it—probably TITAN and CENTAUR—could send 20,000 lbs. to moon or put heavy probe deep in space. First launchings are scheduled to be in early 1963.

SCOUT NASA

Type: Four-stage Satellite Launch Vehicle
prime: Chance Vought
guide: Minn-Honeywell
power: Aerojet/Allegany/Thiokol
Obj: Designed to place 200-300 lb. satellites in orbit.

★ Some delays in this 4-stage rocket has caused sked. operational date to now be late summer 1960.

SHEPARD ARPA

Type: Tracking Satellite
prime: no contracts announced
Obj: Tracking and data reduction

★ This satellite will soon come into more prominence. It is needed.

STEER ARPA

Type: Communications Satellite
prime: Bendix
Obj: Destined to serve the Strategic Air Command for communications purposes, STEER is part of the NOTUS project. STEER will be launched in a polar orbit. Still in R&D. Army will dvlp the satellite, AF will launch it.

(7th Sheet)

DATALOG OF MISSILE, SPACE AND DETECTION PROJECTS

SPACE PROJECTS, February 1960

★ *New information this month*

SUNRISE ARPA

★ PROJECT SUNRISE will make studies of advanced military weapons with special concentration on space delivery.

SUZANO ARPA

Type: Space Platform prime: no contracts announced
Obj: Designed to provide space platform for assembling Outer Space Vehicles, and to be used as a springboard base for advanced space missions.

★ "O SUZANO don't you cry for me!" . . . **cry for money!** Project being cancelled for lack of funds and as necessary "must go" in ARPA shake-up.

THOR-ABLE NASA

Type: Large Booster guide: GE
prime: Douglas/Space Tech Labs power: Rocketdyne/Aerojet
Obj: Designed for deep space probes of lighter payloads than ATLAS-ABLE.

Good reliability has been had with this combination. Uses continuing for putting probes deep in space and for moon and sun orbit shots.

THOR-DELTA NASA

Type: Satellite Launching Vehicle guide: ITT
prime: Space Tech Lab power: Aerojet/Allegany
Obj: Designed to put small satellites (50-80 lbs.) into orbit around moon.

First flights scheduled for early 1960.

TIROS NASA

Type: Meteorological Satellite
prime: RCA
Obj: Designed to take television pictures of cloud formations and frontal systems.

TIROS promises to give more revelations about nature of weather. Army Signal R&D Labs at Fort Monmouth involved in initial planning. Navy is also fostering TIROS. Shot is planned for mid-year 1960.

PROJECT TRANSIT ARPA

Obj: Astro-Geodetic Navigation Satellite

★ PROJECT TRANSIT has been encountering delays due to booster problems and voices questioning current need for the project. Shot sked. for February now sked. for March.

PROJECT TRIBE ARPA

Obj: Outer Space Vehicles

PROJECT TRIBE is a research, experimentation and systems dvlpmnt designed to obtain at the earliest practical date a continuing family of military space vehicles capable of satisfying the needs for space missions as may be determined by Secretary of Defense from time to time. Guidance, stabilization and control components necessary to satisfactory performance of the vehicles shall be included in the scope of this assignment. The SATURN Task and AGENA Task are part of Project TRIBE.

VEGA NASA

Type: Solar System Probe Vehicle
Obj: Designed to probe moon, Mars and Venus.

Project was cancelled 11 December 1959.

X-15 AF/Navy/NASA

Type: Rocket-Powered Manned Aircraft
prime: North American
power: Thiokol
Obj: Designed to take man in controlable a/c to fringes of outer space—100,000-ft. altitude, at speed of Mach 5 (better than 3600 mph.).

★ Few people not associated with project know there are 3 X-15 a/c. One is rebuilding after breaking dorsal members on rough landing. Hull numbers are 670, 671, 672. Four successful power flights have now been made.

DETECTION PROJECTS, February 1960

BALLISTIC MISSILE DEFENSE
BMEWS AF

Type: Ballistic Missile Defense Radar System
prime: RCA
Obj: Ballistic Missile Early Warning System designed for 40-minute notice of approaching enemy ICBMs.

System to cost around $700 million. Two units ready, one more building. Works with SAGE.

PROJECT DEFENDER ARPA

Obj: Ballistic Missile Defense

ESAR, TRADEX and PINCUSHION are only part of the entire ballistic missile defense program of ARPA. The GLIPAR studies, (Guide Line Identification Program for Anti-Missile Research) is also a part of Project DEFENDER.

ESAR ARPA

Type: Advanced Warning Radar
prime: Bendix
Obj: Electronically Steerable Array Radar is designed for ground installation to warn of approaching enemy missiles. Multitude of individual cells will give more flexibility than other systems of steerable radar.

GLIPAR ARPA

Type: Study Group for Missile Defense
Obj: Designed to work on future ICBM defense. Called upon by DEFENDER and LONGSIGHT.

PROJECT LONGSIGHT ARPA

Type: Study System in Missile/Space Field
Obj: Recommendations as to projects which should be initiated to satisfy future military requirements. GLIPAR (Guide Line Identification Program for Anti-Missile Research) which was initiated. GLIPAR is now used by both LONGSIGHT and DEFENDER. LONGSIGHT more advanced than DEFENDER.

PINCUSHION ARPA

Type: Advanced Radar prime: Raytheon
Obj: PINCUSHION is a many-frequency radar installation to be located on Kwajalein in the Marshall Islands, initially, as an early warning radar of a more variable type than TRADEX or ESAR.

SAGE AF

Type: Continental air warning and control network
prime: IBM
Obj: Provides a push-button missile defense utilizing a search radar system to locate enemy aircraft and destroy them with integrated BOMARC missiles.

TRADEX ARPA

Type: Advanced Radar Prime: RCA
Obj: TRADEX is a modification of the radar types recently designed for BMEWS (Ballistic Missile Early Warning System). It should have better range.

VELA ARPA

Obj: Research, experimentation and systems dvlpmnt related to the nuclear test moratorium.

Working on nuclear test band discrimination.

DATA 1960 SCHEDULE

JANUARY 1960
AIR RESEARCH & DEVELOPMENT COMMAND
Deadline for advertisements: 20 December 1959

FEBRUARY 1960
NAVY BUREAU OF NAVAL WEAPONS
Deadline for advertisements: 11 January 1960

MARCH 1960
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
Deadline for advertisements: 8 February 1960

APRIL 1960
NAVY SUPPLY SYSTEM
Deadline for advertisements: 7 March 1960

MAY 1960
ARMY ORDNANCE CORPS
Deadline for advertisements: 11 April 1960

JUNE 1960
AF AIR MATERIEL COMMAND
Deadline for advertisements: 9 May 1960

JULY 1960
NAVY ANTI-SUBMARINE WARFARE PROGRAM
Deadline for advertisements: 6 June 1960

AUGUST 1960
NAVY ASTRONAUTICS PROGRAM
Deadline for advertisements: 5 July 1960

SEPTEMBER 1960
ARMY SIGNAL CORPS
Deadline for advertisements: 1 August 1960

OCTOBER 1960
ARMY RESEARCH & DEVELOPMENT PROGRAM
Deadline for advertisements: 5 September 1960

NOVEMBER 1960
MUTUAL SECURITY (ICA) PROGRAM
Deadline for advertisements: 3 October 1960

DECEMBER 1960
THE DEPARTMENT OF DEFENSE
Deadline for advertisements: 31 October 1960

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DATA 1960 SCHEDULE

JANUARY 1960
AIR RESEARCH & DEVELOPMENT COMMAND
Deadline for advertisements: 20 December 1959

FEBRUARY 1960
NAVY BUREAU OF NAVAL WEAPONS
Deadline for advertisements: 11 January 1960

MARCH 1960
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
Deadline for advertisements: 8 February 1960

APRIL 1960
NAVY SUPPLY SYSTEM
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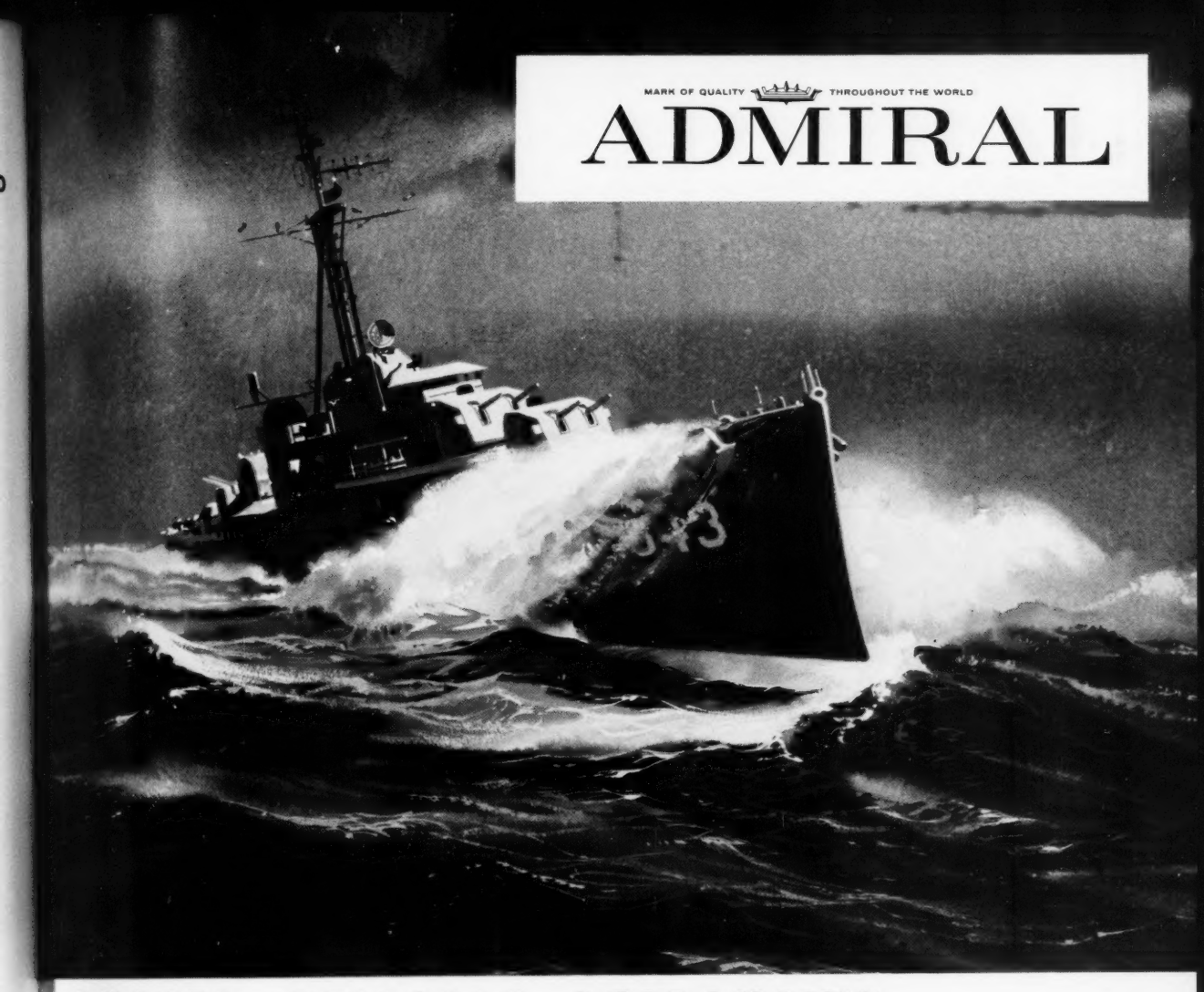

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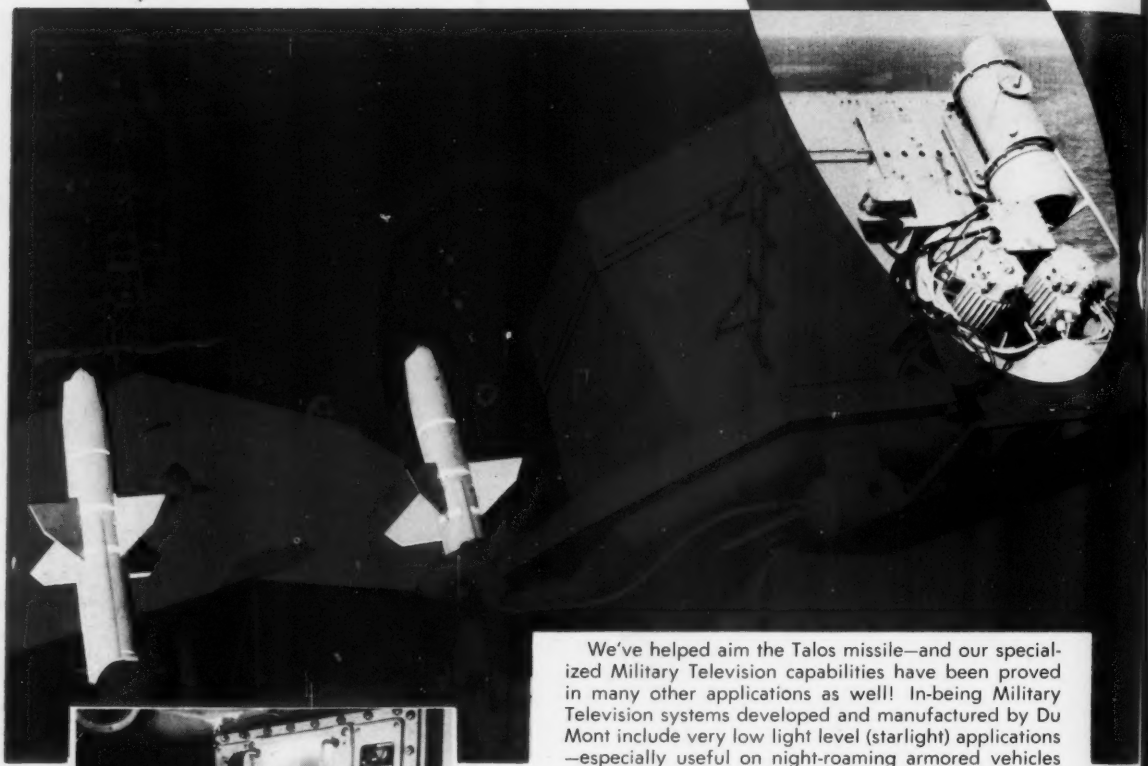

We've helped aim the Talos missile—and our specialized Military Television capabilities have been proved in many other applications as well! In-being Military Television systems developed and manufactured by Du Mont include very low light level (starlight) applications —especially useful on night-roaming armored vehicles and aircraft. High resolution systems providing detailed reconnaissance for drones and space vehicles are also in active development.

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